RAILROAD GAZETTE

FRIDAY, DEC. 27.

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Contributions.

Locomotive Wheel Bases.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Please inform me if there are any longer rigid wheel bases of eight-wheel engines than the following: Rogers Locomotive Works, 9 ft. 6 in.; New York, New Haven & Hartford, 9 ft. 2½ in.; Lake Shore & Michigan Southern, 9 ft.; Rhode Island Locomotive Works, 9 ft. 8 in.; Pittsburgh Locomotive Works, 9 ft. 4 in. S. L. V.

[Referred to the readers of the *Railroad Gazette*.]

The "Soo" Oil House.

Minneapolis, St. Paul & Sault Ste. Marie Railway Co.
OFFICE OF MASTER MECHANIC.
MINNEAPOLIS, Dec. 18, 1889.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In your issue of Nov. 29 you described an oil house constructed for the purposes of this line, and your second paragraph concludes with: "There is also a receiving track, not shown in the drawings, on the other side of the house. This track is about 6 ft. lower, and is used for receiving tank cars, from which the oil is pumped into the house tanks."

Now, we do not have an oil pump about the plant. All oil, whether in barrels or tanks, is received on the elevated track shown in the drawings. When in barrels it is rolled into the house, and when in tank cars it flows by the force of gravity only into the house tanks below. The track on the other side of the house is for the delivery of oil destined for points along the line.

T. A. FRASER, Master Mechanic.

Affairs in Chili.

SANTIAGO, Nov. 22, 1889.

TO THE EDITOR OF THE RAILROAD GAZETTE:

You can have no conception at home of the great shock given to American credit by the unhappy fiasco of the North and South American Construction Co. [We have before announced the transfer of the valuable contract held by this company to Mr. Bernstein, of Chili.—EDITOR]. It is impossible to calculate when and how we can recover from its fatal effects. Mr. Bernstein, who now holds the contract, is going on slowly with the work, but we cannot hope that further orders will be sent to our factories.

Of 44 engines ordered for roads in operation, only six switching engines come from the States. The rest, even when of American design, are English built, while Creusot will get those for new roads. The clause in the contract ordering American pin-connected truss bridges has been canceled, and the entire lot is contracted for by the Creusot works.

The plans for a railroad from Mendoza to Los Andes were approved by the government engineers a few days ago. Of course, I mean the Chili section. There are about five miles of eight per cent. grade to be operated by the Abt system, and many miles of tunnels. In some of these there are eight per cent. grades. X.

The Use of Iron on Mexican Railroads.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The small supply of timber readily available for building purposes on the table-land of Mexico has led to the use of iron for railroad purposes to a greater extent than on the average American road. On the Mexican Central and International roads freight-car trucks of the channel-bar pattern are in use. On the Mexican Railway the trucks are iron, of a pattern similar to those formerly in use on the Boston & Albany, and on the same road there is a very general use of corrugated iron for car sides and roofs. Station and shop buildings have iron truss roofs, covered with corrugated iron, in the majority of instances, and in many cases the same material is used for sheathing the sides of buildings.

The bridges on the Mexican Central and Mexican Railways are almost entirely of iron trusses or girders on stone, while the road crossings consist of rails spiked both outside and inside the track rail.

The Mexican Railway is making all tie replacements on the east end of its line with steel ties from England, and the same are being used with good success on the Panama road.

For minor items, we notice in many places the bumping posts made of rail, as also the curbs around station platforms, the uprights carrying station name boards, as also hitching posts, barriers at stations and lamp posts. Some of the constructions thus made are quite neat and might perhaps be used to advantage elsewhere.

H.

Bridge Guards.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In your issues of Nov. 15 and Dec. 13 Professor Swain and "Engineer" have discussed bridge guards, and I note your editorial on the subject. I am very much interested in the subject, and with a hope of being benefited by any discussions through your columns, I wish to give you my ideas as concisely as possible.

For a number of years I have watched the discussions as to the good and bad qualities of the guard rails brought to a point midway between the track rails at each end of a bridge, and which for the purpose of this letter we will call "the pointed bridge guard," as well as the outside guards and rerailing appliances.

Referring to the former, the point most frequently at issue in these discussions has been whether a derailed truck will take the right side of the guard rail point or not. The real point deserving consideration is whether the pointed guard will guide safely over a bridge a broken truck or a truck that has twisted diagonally or crosswise of the track.

The greater number of wrecked bridges is, I submit, the result of a derailed truck turning diagonally or otherwise across the track, breaking or shoving apart the bridge ties, and allowing cars to drop through. The pointed guard will guide a derailed car safely over a bridge *when the wheels do not take the wrong side of the point and the trucks are not broken*. It is undisputed, I think, that derailed trucks do work past the centre point; and I am informed that the Michigan Central Railroad took off its pointed bridge guards on this account before adopting its present guard, to which I will refer later.

There are various reasons for *sound* trucks passing the centre line of the track, such as the position in which the wheels leave the rails or the striking of some obstruction after leaving the rails. Broken trucks are liable to take either side of the guard point, or may take both sides.

Again, I do not agree with "Engineer" when he says a strong and wide floor is sufficient protection for a bridge. A case in point which bears me out in this contention is the accident on the Grand Trunk at St. George. This, you will remember, was the accident caused by a train going through a bridge. My recollection of the fact is that an engine of a fast express train broke a tire on one of its driving wheels at a distance of 400 or 500 ft. *from the bridge*. The tire flew out before reaching the bridge, and as soon as it did so the spokes of the broken wheel, striking the track rails, either bent or shoved the rails out of place, so that the following cars dropped off the rails on the bridge. The truck of the second car following twisted after dropping off the rails, and bunched and broke the bridge ties, so that the following cars were let through the centre of the bridge, the engine and one car keeping close to the track rails and going over the bridge safely. This, I am informed, was a deck bridge, with a strong and wide floor of ordinary character.

I have examined the Michigan Central bridge guard, and I fully agree with you that it is certainly an admirable one for carrying or sliding derailed cars over a bridge safely with the trucks broken or turned diagonally or otherwise across the track. It suits my idea of a bridge guard more fully than any I have seen. Nothing can catch on the ends, and by bolting the three guards to the ties the strength of a bridge is increased.

Outside guards and rerailing appliances will receive but little attention in this letter. I know of one case where a rerailing appliance did rerail a car at the end of a bridge, and the car went over the bridge in safety. But it has been my experience that only one derailed car out of every four runs or can be brought near enough to the track rails to be rerailed by any such appliance. I am of the opinion that it would hardly pay to take the chances of the three derailed cars striking the rerailers and doing further mischief to the one chance of doing good, while any kind of an inside guard rail would guide a truck running close to the track rails safely over a bridge.

It is possible that outside guards in some cases may be useful, but I have never yet known of a case where a truck had passed the centre line of track where the outside guards have prevented the trucks from taking the wrong side of guard rail point. I do know of two cases where a truck went over an iron outside guard rail, one of them being 4½ and the other 8 in. high.

My observations have been that, when a truck has passed the centre line of track and is not badly broken, the forward wheels between the rails have passed the centre line of the track from 2 to 4 in., and are there dragged along until the truck has been badly broken, the train stopped or wrecked. Trucks in such cases will assume various positions; in the majority of cases they will get badly wrecked and drag along, sometimes thrown completely from under a car; sometimes working back to the following truck.

The requirements of a bridge guard should be to prevent derailed trucks jumping out from under a car, or from bunching and breaking the bridge ties, also in case the train parts to keep a derailed car from running through the sides or over the sides of the bridge.

SUPERINTENDENT.

Interlocking and Block Signals on the Old Colony Railroad.

Office of Superintendent Central Division,
BOSTON, Dec. 25, 1889.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In your issue of the 20th inst. you give what purport to be my remarks upon railroad signals at the December meeting of the New England Railroad Club. The report being so imperfect, and in many respects erroneous, I wish to make corrections.

I said that the Old Colony Railroad has done considerable in the way of block signaling and interlocking. We commenced with the original Hall system of electric block soon after its introduction upon the Eastern Railroad, which answered very well for several years with the light traffic of that period. With the increase of trains we were obliged to abandon the system, and we then adopted the automatic electric system of the Union Switch & Signal Co., with its rail circuit and overlap, which we have continued to the present day and consider a most excellent system. We have upon my division (Central Division) about 75 miles blocked in this manner. Some of the blocks are of half a mile, but generally of a mile in length. We also have isolated signals at points outside of the regular system where more than ordinary protection is required. In all, on my division, there are nearly 160 electric signals, and we are now building an extension of five or six miles of the block. Our Providence Division also has quite an extensive system of the same style of block.

With these blocks there is no need of trouble if the engineman observes the rules given for his guidance. The block signals tell the engineman whether the track is clear or occupied and whether the signals themselves are in working order If the track is clear the signal is white and turns red at a distance of 100 or 150 ft. in advance as the engine enters the section, thus notifying the engineman of the condition of the section and whether the signal is itself working. If the signal is found red it indicates danger, and a stop is made, and the train then proceeds carefully and under control until the next clear signal is found. If the signal is found white and does not turn to red, its mechanism is for the time inoperative, and the engineman is thereby notified, and the train is run carefully and under control, as if the signal had been found at danger. The overlap is the protection after leaving one section and until at a safe distance beyond, and under the protection of, the next signal. We use the block system as auxiliary to the usual protection of flags and lights, none of which protections are relaxed, the system being a permissive block.

With regard to interlocking switches and signals; we have on the several divisions 12 interlocking systems and a thirteenth is now being put in. The system at Mansfield employs 84 levers, is one of the largest in the United States, and is at the junction of the Northern, Providence and Central divisions. We equip our interlocking system also with electric locking and derail switches, which we consider very essential factors of safety, the former checking the mechanical interlocking and the latter being an important protection against collisions at the crossings and switches.

Our main route signals are a modification of and an improvement on the "Hardy" or "B. & A." signals, in which both position and color are introduced. For branch and slow routes we use the Spicer-Schroeder illuminated signals as being different from and not to be confounded with main route signals; and for yard shifting movements we use the ordinary dwarf signals (reflected at night), with track numbers displayed. Our main route night signals are two green lights vertical for "clear;" two red lights horizontal at "home" signals for "stop," and two green lights horizontal at "distant" signals for "caution." Our main route day signals are ordinary semaphores, the "distant" signal being a forked green blade with a white longitudinal stripe, and the "home" signal being a red blade.

I think the foregoing will be more intelligible than your report, and it certainly is more correct.

J. H. FRENCH, Superintendent.

[We regret very much the imperfection of our report. It was made by the Club's stenographer.—EDITOR RAILROAD GAZETTE.]

The "Steel Works Club."

A workman's club house was opened at Joliet, Ill., on Saturday last by the Illinois Steel Co. under the above name. The club house is said to have cost $30,000. The title remains with the Illinois Steel Co., but the club has the use of it rent free. The prime movers in the project have been Mr. W. R. Stirling, First Vice-President of the Illinois Steel Co., and Horace S. Smith. Superintendent at Joliet. Under the old firm of the Joliet Steel Co., about two years ago, the plan was started which is now carried out so handsomely by the Illinois Steel Co. At the dedication it was intimated that if the promises of this first club are fulfilled there will be a clubhouse of like character erected at the other works of the company.

The dedication on Saturday was very successful. Some 1,100 employés were present, and many visitors from Chicago and elsewhere.

Mr. O. W. Potter, Chairman of the board of directors, presided, and Mr. A. J. Forbes-Leith, President of the company, delivered an address of welcome, at the close of which he handed over the lease of the building to Samuel Fewtrell, one of the workmen and President of the board of directors of the club. Mr. Fewtrell thanked the company on behalf of the workmen, and called attention to the fact that corporations, contrary to the general opinion, do have souls.

Mr. W. R. Stirling, for the trustees of the club, then read the charter of the club, which defines the objects for which it has been formed, namely: To promote healthful recreation and social intercourse between the members and to afford opportunity for physical, intellectual, scientific and moral culture. The steel company has elected a board of five trustees, which will not interfere in the management, but reserves the right of veto, to be exercised whenever, in its judgment, this property is being diverted from its proper uses.

The only rules imposed by the trustees for the observance of the club are:

"No spirituous or intoxicating liquors shall be sold, used or brought onto the premises.

"No betting or gambling shall be permitted upon the premises.

"All reasonable and proper care of the property devoted to the use of the club shall be exercised.

"No religious or political meetings shall be held withing the building or upon the grounds, for the reason that among our employés there may be members of all political and religious parties; therefore, for the purpose of protecting the equal rights of all within the membership of the club, we deem it wise to enforce this rule.

"No conduct shall be permitted within the building or upon the premises hostile to the objects or injurious to the character of the club."

The annual dues for membership in the club are $2, payable quarterly or otherwise, in advance. The expenditure of the money thus raised and of money derived from admittance fees to entertainments, lectures or classes, will rest solely with the directors. The Illinois Steel Co. will provide the services of a competent superintendent and librarian, free of charge; also light, heat and payment of taxes. The city of Joliet will supply all water needed, free of cost. The company will also keep the building in repair. Some of the principal stockholders of the company have shown their personal interest in this club by presenting to the club house a grand piano, hall clock, statuary, etchings, engravings, globes and other articles. The library already contains about 2,000 books; its shelves, however, have a capacity of double that number. The company undertakes to supply, free of cost to the club, such additional books as may be called for by club members, until the number of 4,000 shall be reached, provided only that the character of the books demanded be not contrary to the spirit of the institution.

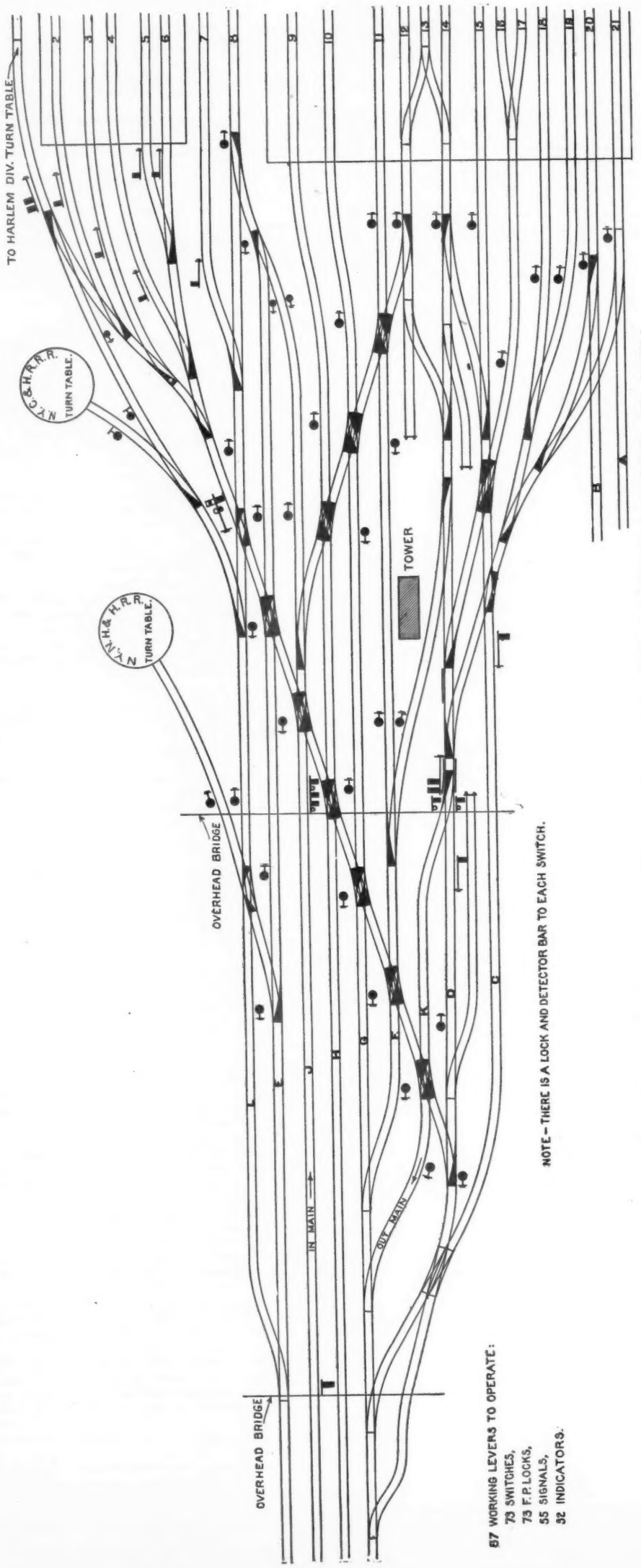
Mr. Stirling added: "We say to you, in conclusion, be men. We put you on your honor to think, speak, act as men in this club. You will find no signs in the rooms with the word 'Don't' in them; no notice to 'Use the spittoons,' 'Wipe your boots,' 'Take off your hat,' and so forth. We look to you to acquit yourselves like men, and to be honest with us and to each other in the use of all your privileges, and thereby justify the confidence we repose in you."

Interlocking at the Grand Central Station, New York City.

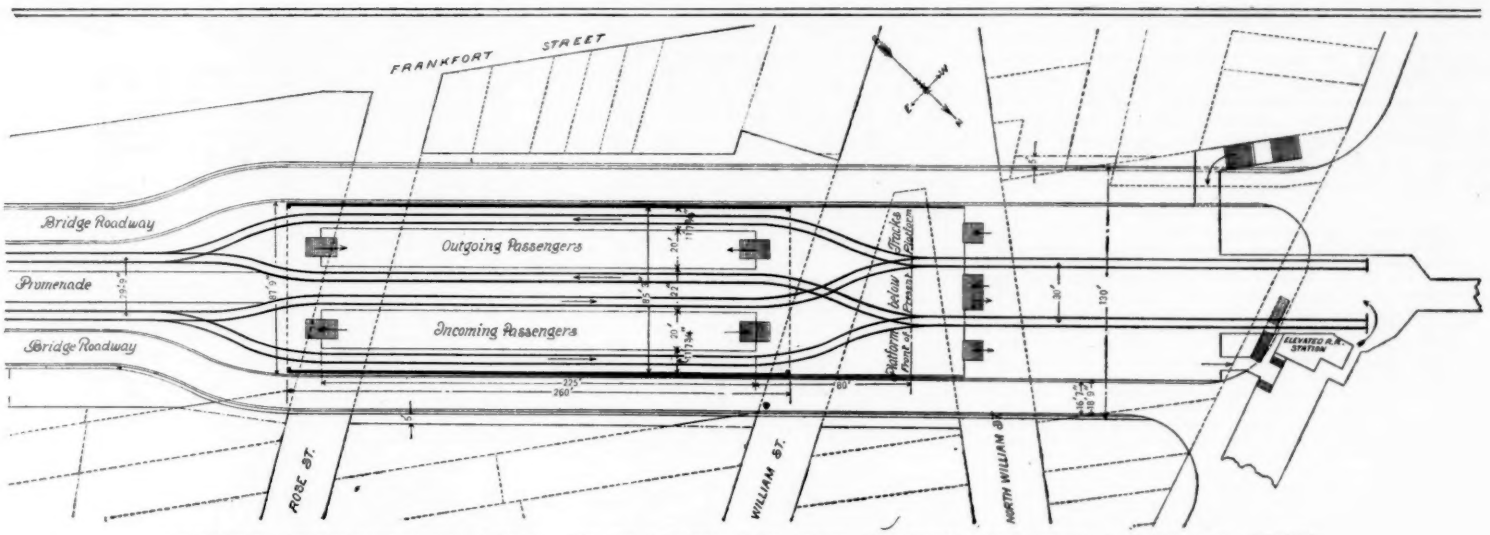
We present herewith a diagram of the yard of the Grand Central Station in New York City, as recently equipped with interlocking switches and signals by the Union Switch & Signal Co. As stated in the *Railroad Gazette* of Dec. 13, the interlocking machine erected in 1883 was worn out by hard service, and a complete new machine, with connections, has now been put in. Eleven new switches and 10 new signals were added, and facing point locks, with detector bars, were placed on every switch. By working a number of signals from one lever, with the aid of a selector, and by working a detector bar, a lock and a switch, from a single lever, the total number of levers has been reduced from 112 to 87.

The entrance to the yard is shown at the left of the illustration, the old (or outward) and the new (or inward) train houses appearing at the right. Trains depart from this station on the west side and arrive on the east, all trains running on the left-hand track for several miles out of the city. All inward trains are run into the station by a running switch, the engine running on to track 8, and the cars either through the east ladder to the regular inward station (tracks 2 to 7) or through the short ladder to some one of the first four tracks in the outward station (9 to 12). Only local trains are discharged in the outward station. The heavy shading on the switches shows the normal position of the rail. Switches to the left of tower No. 1, shown unshaded, are operated by the next adjoining tower (at 49th street). A few switches at the right of the tower near the train shed, shown unshaded, are worked by hand. Disk signals are used for nearly all the switching signals in the older portions of the yard because there is not room for the erection of semaphores.

In cases where a switch is unlocked, thrown and



GRAND CENTRAL STATION, NEW YORK CITY.—DIAGRAM OF YARD TRACKS, SHOWING INTERLOCKED SWITCHES AND SIGNALS.



PROPOSED ARRANGEMENT OF TRACKS AND PLATFORM—NEW YORK TERMINUS NEW YORK & BROOKLYN BRIDGE.

locked by a single movement of the lever, two spiral springs are fixed upon the rod attached to the detector bar; the weight of the rod and bar in falling compresses one of the springs, which then, by its recoil, assists the lever man in lifting it for the next movement. These springs are the only aid introduced to enable the additional work to be performed by a single lever. The signal shown on the bridge for track *J*, at the entrance to the ladder, is arranged in this way, this being the switch most used for flying the trains into the station. and therefore requiring to be moved with great celerity,

This yard is now one of the most crowded in this country. The unfavorable location of the turn tables and engine houses, the small number of tracks available for loading passengers from two of the three waiting rooms, the insufficiency of storage tracks and other causes, combine to necessitate a large number of movements for a moderate number of trains. On Nov. 27 the movements at this tower were counted and found to aggregate 2,363, an average of almost 100 an hour. The largest number of movements for any one hour was from 8 to 9 a. m., as will be seen by the following list. The highest previous record was one taken three years ago, when 105 movements were made in a single hour.

Number of movements made at tower No. 1, Grand Central Station, Nov. 27, 1889:

12 to 1	a. m.	12	12 to 1	p. m.	91
1 " 2	"	45	1 " 2	"	126
2 " 3	"	39	2 " 3	"	111
3 " 4	"	19	3 " 4	"	144
4 " 5	"	8	4 " 5	"	140
5 " 6	"	36	5 " 6	"	172
6 " 7	"	90	6 " 7	"	152
7 " 8	"	175	7 " 8	"	95
8 " 9	"	192	8 " 9	"	88
9 " 10	"	157	9 " 10	"	75
10 " 11	"	142	10 " 11	"	36
11 " 12	"	146	11 " 12	"	72
			Total		2,363

As we have before stated, the Union Switch & Signal Co. performed a remarkable feat in replacing this machine without any interruption to traffic. It had been held impossible by high authority on such work to make such a change without disconnecting the levers for a considerable length of time, and the first proposition in this case was to put the interlocking out of use for thirty days. By careful planning, however, and by finding favorable locations for placing new ground connections before taking up the old, the Union Switch & Signal Co. concluded that it would be necessary to work the switches by hand only five days, but the crowded condition of the work rendered hand-signaling so very burdensome that another attempt at reduction was made, and it was finally decided to do no hand signaling whatever. The new machine was set up in a shed and got into working order before being placed in position, and the levers were then put in by sections, new levers being connected with old rods and wires temporarily where found necessary. A portion of the interlocking was disconnected for four hours on a Sunday morning, but even then the levers were used. This was doubtless a safer plan than to put the same men on the ground where they would have a much poorer view aud where their surroundings would necessarily be slightly unfamiliar. The work has occupied about three months, and has been under the direction of Mr. J. T. Cade, the Eastern Superintendent of the Union Switch & Signal Co., who deserves much credit for the skillful solution of such a complicated problem.

The Terminals of the New York and Brooklyn Bridge.

Some time ago the trustees of the Brooklyn Bridge applied to the courts for an order condemning certain property at the New York end of the bridge, for the purpose of increasing the facilities. It was shown in the application that on the opening of the bridge arrangements had been made for carrying about 40 per cent. more passengers than had formerly been transported by the Fulton Ferry, and that this calculation was a correct one, about 8,000,000 passengers having been carried in the first year. But during the past year the number has increased to nearly 34,000,000 passengers annually, and the land now possessed by the trustees is insufficient for the construction of safe and convenient entrances, exits and platforms. It was contended by the owners of the property that the trustees had exhausted the powers conferred by the legislature; that there were covenants in the deed to the trustees, binding them not to build on the premises conveyed to them; that no offer had been made to the owners, and no attempt to settle the damages within the meaning of the statute, and that no necessity for taking the property had been shown.

On Dec. 19 Judge Morgan O'Brien, of the New York Supreme Court, handed down an opinion condemning the land. This opinion, which is very long, contains some novel views, at least to laymen; and possibly the Court of Appeals will be called upon to settle these questions finally. A brief account of Judge O'Brien's decision in regard to the different points raised by the owners of the land is appended:

With respect to the first point, it was shown that there had been legislation on several occasions, to enable the trustees to condemn land on the Brooklyn side; but the judge cites the following words of the Bridge Act: "The said trustees shall have power to purchase, acquire and hold for the cities jointly as much real estate as may be necessary for the site of said bridge, and all piers, abutments, walls, toll-houses and structures proper to said bridge, and for the opening of suitable avenues of approach to said bridge;" and concludes that the land must be appropriated as a public necessity, not for the purpose of constructing "additional approaches or terminal facilities, but rather to render those already constructed safe and suitable for public travel."

The fact that the trustees are bound not to build upon the premises conveyed to them is discussed by the judge as follows: "There is no doubt that the deed mentioned created in favor of the premises in question an easement, and imposed a servitude upon the lands conveyed. There is nothing in the deed binding in terms the trustees not to condemn the lands, and it is doubtful whether trustees, who are public officers, to whom the power of eminent domain was delegated for public purposes, could make such an agreement binding upon either themselves or their successors."

It appears that the premises sought were offered at a price between $175,000 and $200,000 more than the trustees were willing to pay. The judge concludes that this shows an honest attempt to agree. The necessity for appropriating the ground is considered to be fully proven, and the judge adds: "It is strenuously contended that the use to be made of the additional land sought to be acquired, as shown by the plan, is inconclusive, by failing to prove that if adopted and carried into effect it will secure such needed additional facilities, or conduce to a better operation of the railroad or the public weal. It hardly comes within the scope of a judicial inquiry to examine and determine as to the relative merits of rival plans, and thus take away discretion in this respect vested in the trustees by statute."

The opinion terminates as follows: "It will be seen, therefore, that I have concluded, though not without some hesitation, that the power exists in the trustees to make this application, and that the acts referred to not only authorize but demand and require that the bridge as constructed should be kept and maintained in a safe condition and afford adequate facilities and needed accommodations for protecting the lives of the traveling public.

"The objections, therefore, are overruled, and the application granted."

Under this decision, the trustees expect to acquire land on each side of the bridge at the New York end, thus wiping out two of New York's many liquor saloons, and nearly doubling the carrying capacity. It is proposed, when the land is acquired, to widen the platforms, aud construct an additional track on each side, so that the incoming and the outgoing platforms will each be between two tracks as shown in the plan given herewith.

These tracks will be continuous the length of the bridge making two tracks each way. The tracks will be gauntleted, as the space is not sufficiently wide to separate them entirely. This arrangement will dispense with switches entirely for *loaded* trains approaching and leaving the platforms. There will simply be one frog for the crossing of the incoming tracks and one for the outgoing tracks. Automatic frogs will be used there if, after careful trial, they are found satisfactory. The tracks will be continued to the west two switching tracks as shown. It is proposed that incoming train No. 1 shall come in on the north side of the platform, unload and go on to the northerly switching track. Then train No. 2 will come in on the south side of the incoming platform, discharge and pass to the southerly switching track. Then train No. 1 will pass out to the track on the north side of the outgoing platform, load and pass on, to be followed after the proper interval by train No. 2, which loads on the south side of the platform. It will be seen that no loaded trains go over the crossing at the west end of the platforms, and there are but two switches.

The present interval between trains is supposed to be 90 seconds. It is expected that the proposed arrangement will reduce this interval to 45 seconds.

Considerable testimony was taken at the hearing of this case as to the safety or practicability of this plan of working. The most significant, perhaps, is that of Col. Hain (General Manager Manhattan Elevated), who said "This is a feasible and safe plan," and that of Col. Martin (General Manager Brooklyn & Union Elevated), who operates certain yards on much the same plan and moves trains on 53 seconds headway.

The wagon way on each side will diverge from a straight line near the New York end, and reach the street by a curve, with entrances on the acquired lands.

Locomotive Trials in Chili.

We have received two reports of trials made last July at Valparaiso, Chili, to ascertain the comparative power and efficiency of two locomotives on the Valparaiso Railroad. The dimensions and weights of these engines are given in report No. 2, which follows. It should be noted that, although they are called American and English engines, both were built in Valparaiso. The "Mapocho," No. 14, was built, we understand, from English designs and had originally three pairs of drivers coupled, but was altered to an eight-wheeler. The "Victoria," No. 150, is a mogul, built by Messrs. Lever, Murphy & Co., of Valparaiso.

The eight-wheeler is the standard adopted for general freight and passenger service on the Valparaiso and Santiago section of the state roads, but heavier. She has 30 tons on the drivers; whereas the standard has 23 tons. The mogul was designed as standard for the Southern sections.

The trials were made on the "Tabon grade." It appears that the maximum grades on this piece of road are about 2¼ per cent., and curves 600 ft. radius. Trains are worked up this incline with three engines in front and two pushing.

The trials were made ostensibly for a commission appointed in compliance with the railroad law, to examine into the working of the Chilian State Railroads and report to the government, indicating such reforms in changes of roadbed, machinery and working as they might deem proper. The commission consisted of Señor Villarino, a civil engineer of prominence, and Señor Sanchez, Superintendent of the Santiago Horse Railroad Company. They procured the aid of Señor Victor Carvallo, Mechanical Engineer, of Santiago, and Señor Tomas Stillman, lately Master Mechanic, Autofagasta Railroad, who wrote and published report No 2, which follows, considering it necessary for the sake of his own reputation.

The Superintendent of Motive Power, Mr. Hall, was not present at the tests, nor was either of the heads of the Commission. If either of the three had been there it is probable that the order to oil the rails and have the mogul make the first trip would not have been made.

An American was invited the day before to be present at the trial. He recalled the trial of some 15 years back between the "Contraliste," of Rogers build, and No. 32, of English make, and said: "Why should I lose my time? There is sure to be some rascality, and, therefore, I know the result already." No American was present, Mr. Stillman being a Chilian and the others generally Scotch, excepting the brakeman.

REPORT NO. 1.

The trial was made with a train of 18 loaded (four-wheel) cars that were first hauled by the English engine, which went along easily through the curves preceding the Centinela Tunnel, the speed slacking very much from here forward on encountering the reversed curves and grades which form this most difficult part of the line. Before reaching the second tunnel the locomotive had slipped her drivers 19 times, and on striking the moist rails at this last point she stopped altogether, and was obliged to get assistance from the pusher that was following. The trial demonstrated that the adhesion was not equal to the steam power.

Returning to Llaillai, the American engine [mogul, by Lever, Murphy & Co.—EDITOR] was attached to the train, and went over the first part of the road with ease, but on the most tortuous part of the incline the influence of the stiff wheel base showed how inadequate it was for such work, and resource was had to the pusher. From the start a slight tendency to slip was noticeable for the first eight kilometres. Although passing through shaded parts of the road where the rails were moist, there were but two slips of the wheels, and the engine stopped only because the piston rod ceased motion. Passing, with the aid of the pusher, the worst curves, the auxiliary engine was cut off, and the mogul took the train almost to the summit at Montenegro. This trial demonstrated the steam power as being on the mogul inferior to the adhesion, or exactly the reverse of what was observed in the English locomotive.

REPORT NO. 2.

The weights were taken with a patented scales, by which the load on each wheel was recorded, said weight only varying by 40 lbs. from that recorded in the books at the shops.

Engine "Mapocho" No. 14. 4 wheels coupled.

Drivers:	Right.	Left.
Trailing	17,780 pounds.	14,756 pounds.
Leading	11,508 "	15,988 "
Bogie wheels:		
Leading	9,380 "	7,252 "
Trailing	8,372 "	9,380 "
Total weight on drivers	60,032 pounds.	
" " bogie	34,384 "	
Total weight of locomotive	94,416 "	

Rigid base, 8 ft. 6 in.; diameter drivers, 56 in.; cylinders, 18 in. × 24 in.; steam pressure, 160 lbs. per sq. in.

Engine "Victoria" No. 150. 6 wheels coupled mogul.

Drivers:	Right.	Left.
Trailing	12,628 pounds.	12,292 pounds.
Intermediate	12,852 "	13,188 "
Leading	12,852 "	11,956 "
Bogie wheels	7,924 "	8,075 "
Weight on drivers	75,768 pounds.	
" bogie	16,968 "	
Total weight of locomotive	92,736 "	

Diameter of drivers, 56 in.; cylinders, 17 in. × 24 in.; pressure, 160 lbs.

At Llaillai I examined the coal and had the tender of the "Victoria" filled with Australian coal, which was the same as that the "Mapocho" brought in its tender from Valparaiso.

The Master Mechanic told the driver of the "Mopocho" to clean his fire and that the "Victoria" would be the first to mount the grade, to which end he arranged a train of 16 cars besides the coach carrying the officials, the approximate weight, without engine and tender, being 226,956 kilograms (499,300 lbs.) After some reflection I exacted of the Master Mechanic that the "Mapocho" make the first trial, as the train hands knew the peculiarities of the road, whereas the driver of the "Victoria" did not. After no little opposition my request was acceded to, the "Mapocho" was coupled to the train with passenger coach ahead, leaving Llaillai at 11:50, the engine in charge of driver Anderson and his fireman. Two other enginemen went to attend to sanding the rails. Starting with 150 lbs. of steam, the engine commenced slipping before arriving at Centinela Tunnel, but maintained a slow, steady pace until arriving at Los Loros Tunnel, where she stalled for lack of adhesion.

The steam pressure during the trial varied from 150 to 165 lbs. [160 to 175 actual because of the defective gauge —EDITOR], the starting bar in the lowest notch, while, as has been said, two additional locomotive runners kept up a constant flow of sand on the rail until the engine came to a full stop.

The trial demonstrated the correctness of the calculation before made, that the engine showed a lack of adhesion for 18-in. × 24-in. cylinders with 160 lbs. pressure.

About 1,230 ft. before arriving at Los-Loros Tunnel both rails *were found to have been oiled* quite recently, and apparently by using oil cans for the purpose. This oiling was done up to a point inside the tunnel. Mr. Brunton tells me this was done by the engine runner and fireman of the pusher that had assisted the express up the grade, and according to what he says they have been suspended. From the orders that were given before commencing the trial, and from the determination shown by the Valparaiso train hands that the "Victoria" should take the lead in the trial, I have formed the opinion that there was evident bad faith, and whoever may be the culpable party, he should be severely punished. The Government Commission has been made a butt for ridicule and hoax, and the act shows demoralization and want of discipline in the employés.

Locomotive "Victoria" was attached to the same train, and started at 1:45 with driver, fireman, and the same crew. On leaving, the gauge showed 140 lbs. pressure, and the engine did well until leaving Centinela Tunnel, where she, for the first time, slipped her drivers, and from here full stroke was given and sand used. Steam pressure varied between 140 and 162 lbs. until arriving at Pilares Point, where the engine stopped, but without slipping; the pressure on stopping being 155 lbs. and the throttle wide open. After this the "Mapocho" acted as pusher to Chilcas; from here to the summit the "Victoria" took the train without assistance. On arriving at the summit the injectors refused to work on account of lack of water in the tender, but the engine took the train to Montenegro station.

It is clear, both from theory and practice, that the four-coupled engine is not the class adapted to the freight service and especially to the Tabon grade, where plenty of adhesion is needed. The actual weight of the "Mapocho" is prejudicial to the roadbed, and no more can be added unless a heavier rail is employed [The rail used weighs about 69 lbs. per yard—EDITOR], the heating surface is about 1,200 sq. ft.—plenty for 18 in. × 24 in. cylinders—and with these two factors established and the weight properly distributed the adhesion could be increased from 15,000, as at present, to 20,000 lbs.

The mogul type is the one in general use in the United States, and on the Coquimbo, Autofagasta, Iquique, Pisaqua and Arequipa roads of this coast (that are owned and worked by joint stock companies) a six-wheel coupled is used, being either of English or American build. What is sought for is economy combined with sufficiency of power to overcome the heavy grades they have to work. Of the afore-mentioned railroads that having the lightest gradient is the Autofagasta with inclines heavier than the Tabon, and I am quite sure if the four-wheel coupled were the most economical for freight traffic, these private companies would have adopted it years ago.

I am advised that the management has lately ordered from England eight locomotives with four wheels coupled and a single pair of trailing wheels, to be used as pushers on the Tabon incline, and it appears these have been ordered at the instance of the Master Mechanic of the Valparaiso section. Such a step, instead of being in advance, is retrograde some 40 years.

It is reasonable to suppose that if an engine capable of hauling 40 cars (four-wheelers) on grades of 2½ per cent. and 600-ft. curves without damage to the permanent way can be procured, such a step should be taken from motives of economy. By the method now employed such a train requires three locomotives, with, of course, the consequent increased outlay.

Some years ago the Baldwin Locomotive Works commenced to build the first moguls; later they started building engines with eight wheels coupled, of the consolidation type, and later with ten wheels coupled, of the decapod type, and it should be borne in mind that all these are proportioned to give only a certain weight per driver according to the strength of the rails. The trial demonstrates that a stiff wheel base of 14 ft. is excessive for the Tabon, a defect in construction that can be remedied without at all sacrificing security. It is also seen that in the engine with 17 × 24 in. cylinders and 140 lbs. steam pressure, although there is sufficient adhesion, the steam power is lacking. The lesson of this trial gives room to study the proper class of locomotive power.

[Signed] THOMAS STILLMAN.

Train Accidents in November.

COLLISIONS.

REAR.

1st, on New York, Lake Erie & Western, at Salamanca, N. Y., a freight train standing on a side track was run into by another freight at the rear, smashing a number of cars.

3d, on New York Central & Hudson River, at Schodack, N. Y., a freight train ran into the rear of a freight taking a siding, wrecking seven cars.

5th, on Union Pacific, at Granite Cañon, Wy., freight train descending a steep grade became uncontrollable, and dashed into the rear of a preceding freight, making a bad wreck, which took fire, and was consumed. A man in charge of sheep injured.

6th, on Philadelphia & Reading, near Exeter, Pa., a coal train broke in two, between the tender and first car, and afterwards collided, wrecking the tender. One trainman killed, and another injured.

8th, on New York, Susquehanna & Western, at Little Ferry, N. J., a passenger train ran into the rear of a coal train standing on the main track with no signals out. Engine disabled.

8th, forenoon, on Pennsylvania, the last eight cars of a freight train broke loose at the top of a steep grade in passing through the tunnel near Gallatzin, Pa., leaving only the conductor and one brakemen to control the speed of the forward portion, 30 cars. There had been a heavy rain, making the rails slippery, and the speed of the train could not be controlled and rapidly increased to over 60 miles an hour. A work train ahead of it was overtaken at Scotch Knob, knocking off the caboose and one tool car. The engineer of the work train put on steam and ran ahead a considerable distance, but at McGarveys the runaway again dashed into it, knocking off another car at the rear of the work train. A mile further on a third collision occurred, this time wrecking two more cars of the work train and derailing a car of the freight, bringing both trains to a standstill. The engine of the freight was not derailed and only slightly damaged. The fireman of the freight jumped off after the second collision, but the engineer went back and helped put on brakes. A man in the caboose of the work train was killed; conductor, engineer and fireman of freight slightly injured.

9th, on Chicago & Northwestern, near Lake Forest, Ill., engine and caboose, which had stopped to cool a hot box, were run into by another engine. One trainman injured.

9th, on West Shore, near Amsterdam, N. Y., a freight train broke in two and the rear portion was run into by a following freight, wrecking the caboose and six cars. There was a dense fog at the time.

9th, on Pennsylvania, at Chickies, Pa., in a collision between the detached portions of a broken freight train three cars were derailed and thrown into an adjacent canal.

9th, on Central of New Jersey, at Roselle, N. J., a coal train ran over a misplaced switch and into some empty passenger cars standing on a siding. Four cars were thrown over an embankment and the engine and a dozen cars were wrecked.

9th, on New York, Lake Erie & Western, at Buffalo, N. Y., an express train ran into the rear of a passenger train. Engine and two rear cars damaged, injuring four passengers.

10th, on Louisville, New Orleans & Texas Pacific, near Mt. Airy, La., a passenger train ran into the rear of a disabled freight. Engine, caboose and several cars damaged.

10th, on Chicago & Northwestern, at Vail, Ia., a freight train which had stopped to do some switching was run into at the rear by another freight. Engine and four cars wrecked.

10th, on Union Pacific, at Silver Creek, Neb., a freight train broke in two, and the two portions collided, wrecking a dozen cars.

11th, on Richmond & Danville, at Lula, Ga., a passenger train ran into the rear of a freight which was going on to a siding. Engine disabled and caboose and one car wrecked. Fireman killed, engineer injured.

11th, on Carolina Central, near Phenix, N. C., a work train ran into the rear of a freight train which was standing at a wood station. Fireman killed and a passenger in the rear car of the freight injured.

11th, on New York Central & Hudson River, near Barnard's Crossing, N. Y., a coal train broke in two, and the detached portions collided, wrecking four cars and blocking both main tracks.

12th, on Pennsylvania road, near Erie Pa., freight train descending a grade became uncontrollable and ran into an empty engine, doing considerable damage.

12th, on Lehigh Valley, near Phillipsburg, N. J., a freight train ran into the rear of another freight in a dense fog. Engine with six cars wrecked.

12th, on Lehigh Valley, near Phillipsburg, N. J., collision between wrecking train and a freight, damaging engine and several cars.

12th, on Pennsylvania, at Rohrerstown, Pa., freight train ran into the rear of another freight during a dense fog. Engine and four cars damaged.

14th, on Chicago, Burlington & Northern, near Dayton's Bluff, Minn., collision between passenger train and empty engine, damaging both locomotives.

15th, on Fitchburg road, near Otter River, Mass., a freight train broke and the detached portions collided, derailing 11 cars.

15th, on Boston & Albany, at Springfield, Mass., a freight train ran over a misplaced switch and into the rear of another freight standing on a siding, doing some damage.

17th, on Northern Central, at Middletown Ferry, Pa., a freight train which had been brought to a standstill, owing to its engine having been disabled, was run into by a following freight, making a bad wreck. Brakeman killed, three other trainmen injured. The flagman of the disabled train failed to go back far enough.

23d, night, on Lehigh Valley, at Bethlehem, Pa., a freight dashed into the rear of a passenger train standing at the station, badly damaging the two rear cars. One trainman killed and three passengers injured.

23d, on New York, Lake Erie & Western, at Howell's, N. Y., freight train ran into the rear of a preceding freight, wrecking engine and three cars.

26th, on Western & Atlantic, near Carterville, Ga., a freight train broke in two and the detached portions collided, wrecking several cars. One tramp killed, one injured.

26th, on Missouri Pacific, near Benton, Mo., a freight train broke in two and the rear portion, which had come to a standstill, was run into by a following freight, wrecking engine, caboose and six cars. One trainman injured.

26th, on New York, Lake Erie & Western, near Middletown, N. Y., a freight train broke in two on a grade and the rear portion ran back and collided with a following freight, wrecking engine, caboose and three cars. Three trainmen in the caboose injured.

27th, on Missouri Pacific, at Kirkwood, Mo., a passenger train ran into the rear of another passenger train, damaging the rear car. Two passengers injured. The damaged car caught fire, but the flames were quickly extinguished.

28th, a. m., on Pennsylvania road, at Rahway, N. J., a collision involving three freight trains blocked all four main tracks for six hours. An eastbound freight stopped on account of a hot box, shortly after passing a block station. The night was stormy and the engineer of the following freight ran by the danger signal at pretty high speed, derailing a large number of cars and wrecking six of them. A westbound freight came along very soon after and was derailed by the wreck, adding a number of its own cars to it. An engineer and fireman were buried in the wreck, but after several hours got out with slight injury.

28th, on Pennsylvania road, near Columbia, Pa., a string of cars in being let down a grade were not controlled and ran into the rear of a locomotive with sufficient force to shove it into the caboose of a freight train ahead of it, doing some damage. A man standing between the cars of the freight was killed.

28th, on Atlantic Coast Line, at Petersburg, Va., a freight train entering the yard was not controlled and ran over a misplaced switch and into a box car standing on a siding. Engine and several cars wrecked and an adjoining building damaged.

29th, on Savannah, Florida & Western, at Opelika, Ala., freight train ran into the rear of another freight, wrecking several cars.

30th, on Southern Pacific, at Atwater, Cal., a freight train ran over a misplaced switch, and into some cars standing on a side track, injuring fireman and engineer.

30th, on joint track of New York, Providence & Boston, Providence & Worcester division, and the Old Colony, Boston & Providence division, at Providence, R. I., a southbound Old Colony express train ran into a switching engine in the yard, doing slight damage. The engineer of the passenger train, after applying the brake, started, apparently, to retreat from the tender to the baggage car, but fell between the two, and was killed. Fireman of switching engine was also killed, and the other engineer and fireman were injured. The track is equipped with the automatic rail circuit block signal, but it appears that the switching engine entered the main track just as the passenger train passed the signal.

BUTTING.

4th, on Northern Pacific, near Spokane Falls, Wash., butting collision between two freight trains, wrecking the engines and several cars of both. Three trainmen injured.

4th, on Pittsburgh & Lake Erie, at Brighton, Pa., butting collision between two freight trains, damaging the engines and five cars.

5th, on Lake Shore & Michigan Southern, near Delta, O., butting collision between two freight trains, due to a misinterpretation of orders. Both engines and a dozen cars wrecked.

6th, on Housatonic road, at Wilson's Point, Conn., butting collision between passenger and freight trains, disabling both engines and derailing several freight cars.

8th, on East Tennessee, Virginia & Georgia, near Brunswick, Ga., butting collision between a passenger train and an extra freight. Both engines and a box car damaged. Express messenger and several passengers injured.

8th, on Cleveland, Cincinnati, Chicago & St. Louis, at Moro, Ill., butting collision between two freight trains, doing some damage.

10th, on Lake Erie & Western, near Fremont, O., butting collision between freight trains, wrecking the engines and a car containing crude oil. The oil was ignited and 12 cars were burnt up.

15th, on Virginia Midland, near Manassas, Va., butting collision between two freight trains, doing considerable damage. Two trainmen killed, four trainmen and a drover injured.

15th, on Illinois Central, near Canton, Miss., butting collision between a special passenger train and a switch engine, damaging both locomotives. One trainman killed, 1 trainman and a tramp injured.

16th, on Northern Central, at Trout Run, Pa., butting collision between a freight train and a construction train, disabling both engines. Engineer and two laborers injured.

20th, on East Tennessee, Virginia & Georgia, at Macon, Ga., a passenger train ran over a misplaced switch and into the head of a freight train standing on a siding, wrecking both engines and several cars.

21st, on Southern Pacific, at El Monte, Cal., butting collision between two freight trains, wrecking the engines and eight cars. There was a dense fog at the time.

22d, on Chicago & Northwestern, near Parker, S. D., a special freight train going north, the engine running backwards, pushing a tender, collided with an engine and caboose coming south, badly wrecking both trains. Three trainmen injured.

22d, on Northern Pacific, near Trout Creek, Mont., butting collision between freight and construction trains. Both engines and a number of cars in each train badly wrecked. Several trainmen injured.

22d, on Louisville & Nashville, at Evansville, Ind., butting collision between a freight train and a locomotive going into the shops. The throttle of the latter was opened by the shock, and, having been abandoned, the engine started backward and ran through the yard some distance, colliding with a switch engine, badly damaging both engines. Fireman injured.

23d, on New York, Chicago & St. Louis, near Argos, Ind., butting collision between freight trains, blocking the track several hours. Engineer killed, and four trainmen injured. Misunderstanding of orders is said to have been the cause.

23d, on Eastern of Minnesota, near Duluth, Minn., butting collision between two freight trains, one of which was running in violation of orders. Both engines and 18 cars wrecked.

25th, on Northern Pacific, at Palmer, Wash., butting collision between two passenger trains, damaging both locomotives, one of which was overturned.

25th, on Cleveland, Lorain & Wheeling, at Flushing, O., butting collision between freight and construction trains, wrecking both engines and 15 cars. One trainman killed, 2 injured.

28th, on Chicago, Milwaukee & St. Paul, butting collision between two freight trains, disabling both engines and derailing a number of cars.

29th, on Missouri, Kansas & Texas, near Bruceville, Tex., butting collision between freight and work trains, wrecking both engines.

CROSSING AND MISCELLANEOUS.

3d, on New York Central & Hudson River, near Stuyvesant, N. Y., a freight train ran over a misplaced switch and into the side of another freight which had stopped at a water tank, damaging several cars.

4th, at Minneapolis, Minn., collision between Minneapolis & St. Louis and Northern Pacific switching engines, wrecking both. A steam pipe of one of the engines burst, badly scalding the fireman.

7th, on Maine Central, near Dexter, Me., a string of cars loaded with gravel, in charge of a brakeman, in being let down a grade, was not controlled and collided with a gravel train which was being pushed by an engine, wrecking three cars. One laborer killed, three injured.

8th, at the crossing, in Birmingham, Ala., an Alabama Great Southern freight ran into a Louisville & Nashville freight. Engine disabled, three cars ditched.

10th, at the crossing near Fostoria, O., a Lake Erie & Western freight ran into a Toledo & Ohio Central freight during a dense fog. Engine and three cars damaged.

11th, at the crossing at Janesville, Wis., collision between Chicago & Northwestern and Chicago, Milwaukee & St. Paul freight trains, wrecking engine and six cars. A section man standing near by was injured.

11th, on Dayton, Fort Wayne & Chicago, near Trebein, O., switching engine collided with some freight cars. Two trainmen injured.

12th, on Central New England & Western, at Campbell Hall, N. Y., a special passenger train ran over a misplaced switch on to a track leading to a car shed, and collided with an empty passenger train just pulling out. Two coaches were driven through the rear end of the car shed and thrown into a pond. One trainman injured.

12th, on New York, Lake Erie & Western, in Jersey City, N. J., a westbound passenger train ran into the rear end of an eastbound freight which was crossing the main track, damaging the engine and three freight cars. An employé riding on the freight was injured. There was a dense fog at the time.

13th, on Fall Brook Coal Co.'s road, at Corning, N. Y., collision between locomotive pushing a caboose and a yard engine, wrecking the caboose. Fireman injured.

14th, on Corning, Cowanesque & Antrim, at Tioga, Pa., engineer of first 69, with orders to pass two opposite-bound freights at this station, forgot all about the second train and started to pull out of the side track upon the arrival of the first train. Discovering his mistake when partly on the main track, he started backward and collided with second 69 just entering the siding. Engine, caboose and 12 cars wrecked. The wreck caught fire and four cars were consumed. Brakeman killed.

16th, at Grand Crossing, Ill., an Illinois Central passenger train was run into by a Lake Shore & Michigan Southern switching engine at the crossing, doing some damage and injuring five passengers.

16th, on Chicago & Northwestern, in Chicago, Ill., collision between an outgoing passenger train and an empty switching passenger train, ditching the engine of the former.

18th, on New York, Providence & Boston, at Northbridge, Mass., a freight train was cut in two for the purpose of backing into a side-track to take on some cars. The rear portion, which consisted of a very long string of empty four-wheel coal cars, was not controlled and ran into the forward portion of the train while it was backing in, wrecking 25 cars and blocking both main tracks all night.

21st, on Chicago & Grand Trunk, near Battle Creek, Mich., collision between a freight train and a yard engine, disabling both engines and derailing several cars.

28th, at the crossing in Memphis, Tenn., a St. Louis, Iron Mountain & Southern passenger train was run into by a Kansas City, Fort Scott & Memphis freight, wrecking a baggage car and disabling the colliding engine.

DERAILMENTS.

DEFECTS OF ROAD.

3d, 6 a. m., on Gulf, Colorado & Santa Fe, near Brownwood, Tex., the two rear (chair) cars of a passenger train were thrown from the track by a broken rail and tumbled down an embankment, landing bottom side up. Twenty-two passengers injured. One of the cars caught fire, but the flames were quickly controlled.

4th, on St. Louis, Iron Mountain & Southern, near Marianna, Ark., caboose and several cars of an accommodation train were thrown from the track by the spreading of the rails and wrecked. Conductor and one passenger injured.

6th, on Pittsburgh & Western, at Callery Junction, Pa., rear sleeping car and one coach of a passenger train derailed and thrown against a freight car standing on a siding and damaged. The derailment is supposed to have been caused by the slipping of a switch pin.

11th, on Mobile & Ohio, near Kenton, Tenn., freight train derailed at a defective switch, the locomotive and four cars being badly wrecked. Engineer, fireman and a brakeman were scalded to death and the conductor and another brakeman were severely scalded in rendering assistance.

12th, on Texas Trunk, near Elan, Tex., a car of a passenger train was thrown from the track by a broken rail, injuring five passengers.

14th, on Louisville & Nashville, near Columbia, Tenn., engine and seven cars of a freight train were thrown from the track by a broken rail and wrecked. Two trainmen killed, one injured.

14th, on Arkansas Midland, near Holly Grove, Ark., rear car of passenger train was thrown from the track by a broken rail and overturned. One passenger injured.

21st, on Chicago, Milwaukee & St. Paul, at Lyons, Ia., tender, baggage car and one coach of passenger train derailed by a broken rail near a trestle, causing the structure to collapse. One trainman and three passengers injured.

22d, on Western New York & Pennsylvania, near Tuscarora, N. Y., a bridge gave way under a freight train, and 12 cars went down into the creek.

22d, on Northern Pacific, near Bearmouth, Mont., five cars of a westbound freight were thrown from the track by the spreading of the rails and wrecked. Brakeman injured.

23d, on Savannah, Florida & Western, near Albany, Ga., the rear sleeping car of a fast passenger train was thrown from the track by a broken rail, overturned and dragged a considerable distance on its side, when the coupling gave way, causing it to go over an embankment. Eight passengers injured.

24th, on Louisville & Nashville, at Ruffner's, Ala., freight train broke through a trestle, wrecking nine cars.

26th, on Illinois Central, near Aplington, Ia., a freight train drawn by two engines broke through a bridge. The first engine got across safely, but the second, together with a number of cars, went down and was badly wrecked. Engineer and fireman killed.

27th, on Chesapeake and Ohio, near Huntington, W. Va., freight train broke through a bridge over Guyandotte River and was wrecked. Engineer killed.

28th, on New York, Lake Erie & Western, at Dyke, N. Y., freight derailed at a switch, a number of cars being badly wrecked. Fireman killed.

30th, on Gulf, Colorado & Santa Fe, near Lometa, Tex., passenger train thrown from the track by a broken rail.

DEFECTS OF EQUIPMENT.

1st, on New York, Lake Erie & Western, near Belvidere, N. Y., a wheel under a car of a freight train broke, ditching nine cars.

1st, on Dunkirk, Allegheny & Pittsburgh, near Cassadagua, Pa., axle under tender of engine of passenger train broke, derailing the baggage and smoking cars. Baggageman injured.

4th, on Louisville & Nashville, near Mount Pinson, Ala., a car of a freight train next to the tender broke down while crossing a trestle, and three cars were thrown into the creek below and the trestle badly damaged.

7th, on New York, Susquehanna & Western, near Oakland, N. J., an axle broke under a car of a freight train, and five cars were derailed and wrecked. The pipes of the Standard Oil Co. crossing the tracks at this point were broken, causing a considerable quantity of oil to escape before it could be checked.

8th, on Northern Pacific, near Butte, Mont., engine and several cars of passenger train derailed by broken tender axle.

13th, on Columbus & Western, near Alexander City, Ala., a car of a freight train broke down and 10 cars were derailed and wrecked.

21st, on Chicago, St. Paul, Minneapolis & Omaha, near Slayton, Minn., mail car of passenger train derailed by a loose wheel.

22d, on Louisville & Nashville, at Anchorage, Ky., tender of engine of passenger train derailed by a broken truck.

22d, on Chicago, Burlington & Quincy, at East Burlington, Ill., seven cars of a freight train derailed by a broken axle and damaged.

26th, on Pennsylvania, near Falmouth, Pa., 15 cars of a freight derailed by a broken axle, many of them being thrown into an adjacent canal. A drover was killed.

28th, on Gulf, Colorado & Santa Fe, near Dougherty, I. T., engine and five cars of a freight were derailed and wrecked by the breaking of a flange on the engine. Two trainmen killed, one injured.

NEGLIGENCE IN OPERATING.

1st, on Long Island, at Woodhaven Junction, N. Y., a locomotive left standing unattended was boarded by two mischievous boys and started. After running a short distance it ran off the track and went into the ditch.

12th, on Lehigh Valley, at Addison, N. Y., seven cars of a freight train were backed off a misplaced switch.

15th, on Northern Pacific, near Butler, Mont., a freight train, descending a steep grade, was not controlled, and attained a very high speed. The engineer gave the whistle signal to prepare the safety switch at Butler, which was done, and the engine and 11 cars ran off the end of the track and were badly wrecked. Engineer and fireman injured by jumping.

16th, on Southern Pacific, near Pierce, Tex., passenger train derailed by misplaced switch. Engine overturned. Fireman injured.

21st, on Duluth, South Shore & Atlantic, near Marquette, Mich., a freight train in descending a grade became uncontrollable and was derailed at a curve, the engine and nine cars going over an embankment. Engineer killed, two other trainmen injured.

22d, on Cincinnati, Wabash & Michigan, at Marion, Ind., eight cars of freight derailed in making a flying switch.

UNFORESEEN OBSTRUCTIONS.

1st, on Denver, Texas & Fort Worth, near Eastonville, Col., a locomotive pushing a snowplow was derailed in charging a snowdrift and wrecked, killing the engineer and fireman and a man riding on the engine.

3d, on Central of New Jersey, near North Branch, N. J., a freight train was derailed by a boulder which had been maliciously placed upon the track. Engine overturned in the ditch, several cars wrecked. Engineer and fireman injured.

4th, on Baltimore & Ohio, at Bull's Falls, Va., a freight train ran over a cow, and the engine and eight cars were derailed and plunged over an embankment into the Shenandoah River. The engineer went down with the locomotive, but escaped uninjured.

7th, on Detroit, Bay City & Alpena, near Oscoda, Mich., a construction train ran into a tree which had fallen across the track. Engine and several cars damaged. Conductor killed.

8th, on Atlanta & Florida, at Atlanta, Ga., an empty passenger train backing into the station ran over a team of mules, derailing the rear car. Three trainmen injured.

10th, on Louisville, New Orleans & Texas Pacific, near Yokena, Miss., freight train ran over a cow and was derailed. Fireman killed.

18th, on Pennsylvania, at Bessemer, Pa., a passenger train ran into a landslide. Engine and baggage car derailed and ditched. Engineer killed, fireman injured.

19th, 3 a. m., on Denver & Rio Grande, near Canon City, Col., a westbound passenger train drawn by two engines ran into a large boulder which had rolled down upon the track at a curve. Both engines wrecked. Two trainmen injured.

19th, on New York, Lake Erie & Western, at Covington, Pa., a coal train ran into a washout and the engine and six cars were derailed and wrecked.

19th, on Philadelphia & Reading, at Winfield, Pa., a freight train ran into a landslide and the engine and two cars were derailed and thrown into the Susquehanna River. Two trainmen injured.

25th, on Kansas City, Memphis & Birmingham, near Cordova, Ala., a passenger train ran into a boulder which had rolled down upon the roadbed, damaging the locomotive.

26th, on Chicago, Rock Island & Pacific, near Montpelier, Ia., freight train ran over some horses, derailing engine and two cars. Two trainmen injured.

27th, on Lehigh Valley, near Pattonburg, Pa., a freight train emerging from a tunnel was struck by a landslide, wrecking eight cars and obstructing the track for a considerable time. A boiler house was also demolished, killing the attendant.

28th, on Chesapeake & Ohio, at Ceredo, W. Va., freight train wrecked by running into a washout. Three trainmen killed.

30th, on Southern Pacific, near Redding, Cal., freight train derailed by a landslide, killing the engineer and injuring two other trainmen.

UNEXPLAINED.

3d, on Central of Georgia, at Wadley, Ga., six cars of a freight train derailed and damaged, killing a trainman.

11th, on Southern Central, at Owego, N. Y., freight train derailed.

13th, on Baltimore & Ohio, at Pittsburgh, Pa., two cars of freight train derailed and thrown across the track.

14th, on San Antonio & Aransas Pass, near San Antonio, Tex., car of freight train derailed and wrecked.

14th, on Chicago, Burlington & Northern, in St. Paul, Minn., switching engine derailed and upset.

16th, on Chicago, Milwaukee & St. Paul, near St. Olaf, Ia., passenger train derailed and one car overturned. Four passengers injured.

16th, on Columbus & Western, near Young's Station, Ala., 10 cars of a freight derailed and wrecked. One trainman injured.

16th, on Philadelphia & Reading, near Annville, Pa., freight train derailed

16th, on Indiana Midland, near Lebanon, Ind., three freight cars and one coach of an accommodation train derailed. The latter was overturned, injuring a passenger.

18th, about 7.15 p.m., on Pennsylvania road, at Pittsburgh, Pa., the smoking car of an eastbound passenger train, running about eight miles an hour, was derailed at a frog and overturned, injuring two trainmen and six passengers. One of the latter was pinned down by an overturned stove and fatally burned.

19th, on St. Louis, Arkansas & Texas, near Waco, Tex., three cars of a mixed train derailed. A passenger was injured by jumping off the train.

20th, on Jacksonville Southeastern, near Jacksonville, Ill., car of freight train derailed and wrecked.

20th on Denver & Rio Grande, at Colorado Springs, Col., two cars of a freight train derailed.

22d, on Pittsburgh, Cincinnati & St. Louis, near Wheeling, W. Va., engine of freight train derailed and ditched.

22d, on Montana Union, near Deer Lodge, Mont., freight train derailed and partially wrecked.

22d, on New York, New Haven & Hartford, at Thompsonville, Conn., freight train derailed.

23d, on Ohio Valley, at Blackford, Ky., caboose of freight train derailed and overturned, injuring a brakeman.

24th, on Central Pacific, near Colfax, Cal., passenger train derailed and partially ditched.

24th, on Louisville, St. Louis & Texas, near Lodiburg, Ky., a bridge broke down under a derailed car of a freight train, and five cars went down in a wreck.

25th, on Northern Pacific, near Amazon, Mont., engine and three cars of freight train derailed and wrecked. Engineer injured.

26th, on East Tennessee, Virginia & Georgia, near Greenville, Tenn., passenger train derailed, wrecking a postal car. Two trainmen and four passengers injured.

26th, on Cleveland, Lorain & Wheeling, at Bridgeport, O., the rear car of a passenger train was derailed and thrown against some coal cars standing on an adjoining track. One side of the car was badly smashed.

26th, on Chicago & Alton, at Kansas City, Mo., switching engine derailed, damaging the supports of an overhead bridge.

27th, on St. Louis, Kansas City & Colorado, near Clayton, Mo., accommodation train derailed.

30th, on Baltimore & Ohio, in Chicago, Ill., freight train derailed on a viaduct. One of the supports of the viaduct was broken, causing a portion of the structure to fall. Two pedestrians were thrown into the street below and injured.

OTHER ACCIDENTS.

4th, on Central Pacific, near Live Oak, Cal., engine of passenger train damaged at a point where the track had been maliciously obstructed by iron bars.

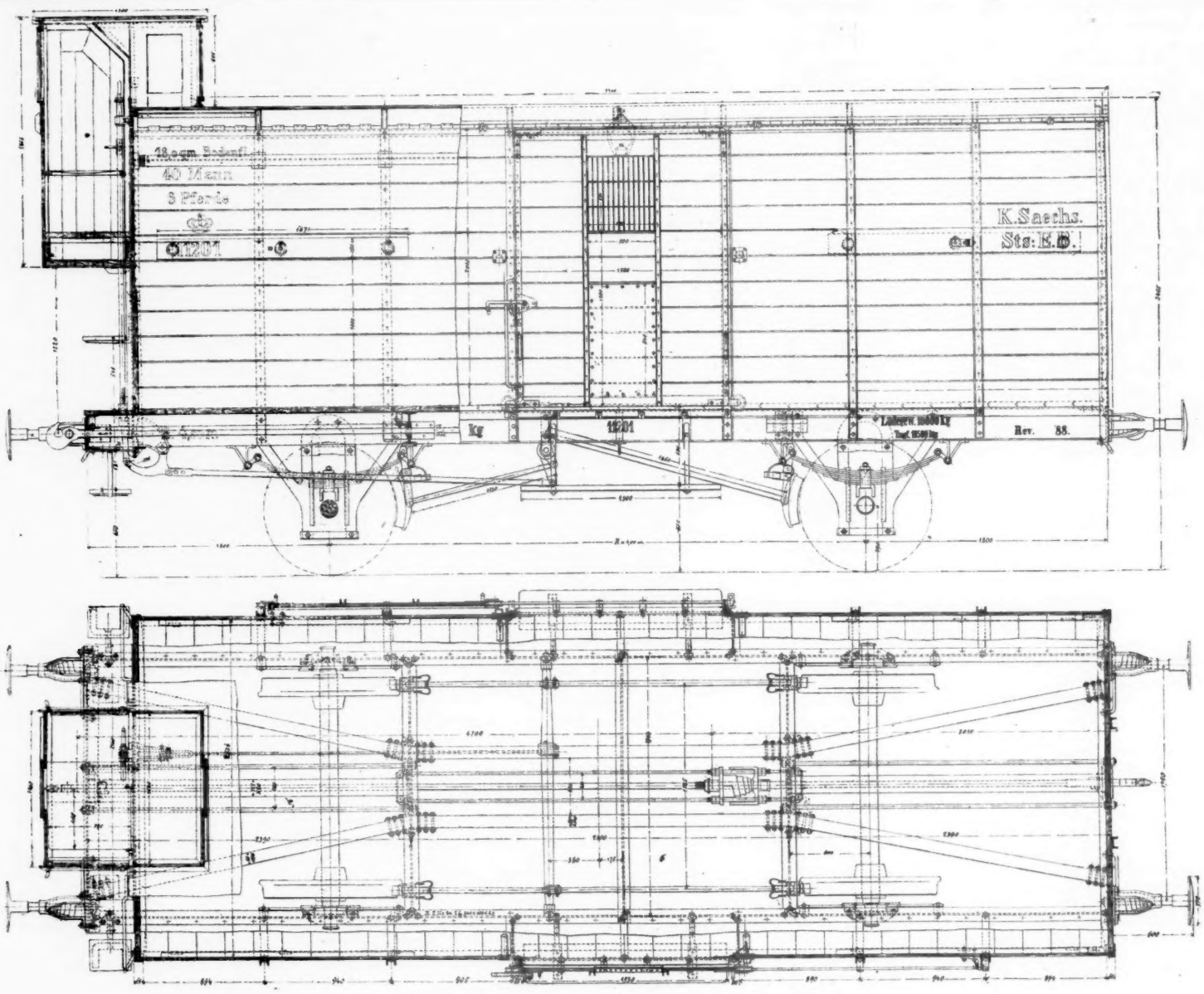
6th, on Manhattan, Eighth avenue line, at 116th street station, New York City, engine of a passenger train blew out a cylinder head.

25th, on Indianapolis & St. Louis, near Greencastle, Ind., crank pin of locomotive of fast passenger train broke and the flying rods injured both fireman and engineer.

A summary will be found in another column.

Emery Wheels.

The eleventh lecture in the regular course before the Franklin Institute of Philadelphia was delivered on Dec. 9 by Mr. T. Dunkin Paret, President of The Tanite Co., Stroudsburg, Pa., on the subject of "Emery Wheels." The lecturer gave a brief historical sketch of the industry. Emery wheels were broadly classed under three heads: those made by some process of vitrifaction; those

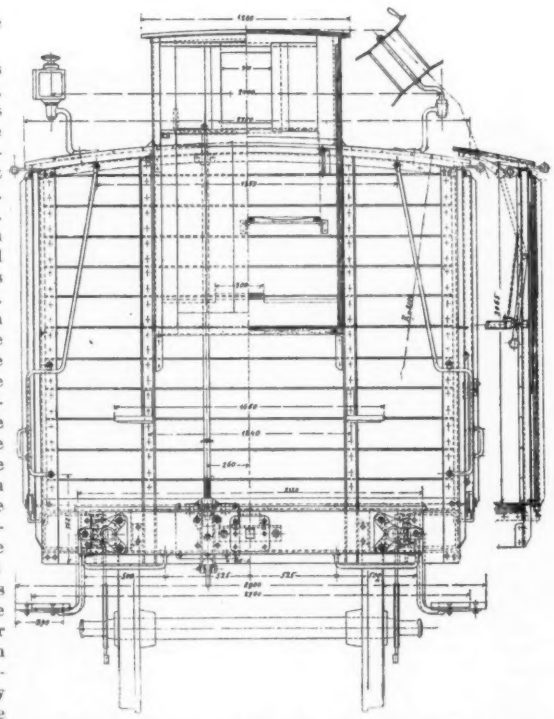


GERMAN FREIGHT CAR, WITH IRON SILLS AND POSTS.

which are practically artificial stones; and those whose base is of vegetable or animal origin. In the first two classes were inherent defects, such as brittleness, hidden cracks and flaws, unequal tension, tendency to glaze or clog up with metal, and, in some, the tendency to deteriorate on exposure to the air. Preference was given to the third class, which could be divided into two sub-classes—those which were mechanical mixtures, and those which were chemical compounds or unique substances. As examples of the latter he named the vulcanized oils and gums, metamorphosed woody fibre and Tanite. The industry was young, and it could not be expected to have the full development which characterized older ones. It was only now that the most experienced wheel-makers were ready to put their industry on a scientific basis, and now the users had lost all faith as to there being any science in the business, while they still felt that solid wheels were a necessity. There were many mistaken demands upon the solid wheel. It was intended to grind and not to polish, and was not meant to supersede all other metal-working processes. The solid wheel had its place on elaborate machines as a substitute for the steel tool usually employed there. It could be used on special machines to do more perfect work than the steel tool, and to work on harder substances. It could be used on general machines as a competitor of the file, grindstone and cold chisel. The solid emery wheel was the great metal remover. To do full work wheels should be put on heavy machines and based on substantial foundations. The work must be in continuous contact with the wheel. Being so, the wheel became a rotary file which ran a mile in a minute, and whose cutting points never grew dull. Unfortunately, these necessary conditions were often not complied with, and only a fraction of the possible work was done. The visible results of a working wheel were very misleading. The greatest delusion was to make durability the standard of perfection in a solid wheel. While it was possible to have a wheel wear out too rapidly for economy, yet very few American wheels were too soft, the bulk being too hard, and their durability being more than balanced by the decrease in metal removable.

A German Composite Freight Car.

The question of the use of iron and steel in car construction is attracting a good deal of attention in this country, and all information regarding the cost of such construction and the different arrangement of parts to permit the use of those materials is interesting. The car shown in the illustrations herewith is one with metal sills and posts which is used on the German State railroads. It is the latest design adopted recently as a standard on those roads. While the construction of this car is necessarily somewhat different from that which would be advisable in American cars, yet there are some points of similarity.



It will be noticed that the arrangement of sills differs from those in American cars considerably, principally for the reason that the buffing strains are wholly taken at the sides and corners of the car instead of at the centre, and the load is carried by the side sills instead of on body bolsters at the centre, as is customary in American cars. There are only two longitudinal sills in this car. They are at the sides, and are made of I-beam iron 9½ in. × 4.2 in. × .33 in. These sills carry the load from the centre and ends of the car to the springs over the wheels, as shown in the side elevation. Connecting the side sills at the end, forming an end sill, is a channel iron, as shown in the side elevation. Three transverse sills are placed, one at the centre and one near each truck. These transverse sills are 9.5 in. × 4.2 in. × .35 in. I-beams. The buffing blows are transmitted to the side sills directly, and, undoubtedly, most of the strain is resisted by these sills. However, there is within the body of the car a set of wooden stringers running from end to end, parallel at the centre, but diverging at the ends, which are intended to receive the buffing blows as well as the side sills. The size of these stringers is 3½ in. × 9½ in. They are securely bolted to joint plates, as shown in the plan. These centre stringers were the subject of a dispute at the time of their adoption, and it is believed by some of the German railroad engineers that they are not superior because they are made of wood, but rather that they are inferior, and should be made of metal like the side sills, in order to fill the functions which they are supposed to perform.

The side posts are made of small channels, 2.56 in. × 1.65 in. × .22 in. These posts are riveted to braces which extend out from the side sills, as shown in the end elevation, and to them are bolted the wooden sides of the car, which are made without linings, and are .87 in. in thickness above the centre of the vertical side and 1½ in. below the centre. They are grooved and matched together with a water-shed joint, as shown.

The carlins are, as well as the side posts, made of light channels, 1.4 in. × 1.6 in. × .2 in., riveted at their ends to the posts, as shown in the end elevation. It will be noticed that at nearly all joints in this car iron is used to make the connection, and attention is directed to this feature at the ends, where angle irons 2.6 in. × 4 in. × .35 in., are used to form a corner. Also angle iron joints are to be seen at the corners of the doors, the braces on the doors, and at the joints in the caboose, which is attached to the upper part of the rear end of the car. The door-stop is made of an angle iron, as shown on the plan. A slide in the slide-doors, noticeable in the side elevation, is made of iron rods and guided in iron guides.

The Germans are an economical people, and in the

selection of this design of car, of which they use a vast number, they have attempted to reduce the cost of repairs and the first cost of construction to the lowest possible limit. Therefore a study of this design may be of use in considering new forms of cars for our own purposes.

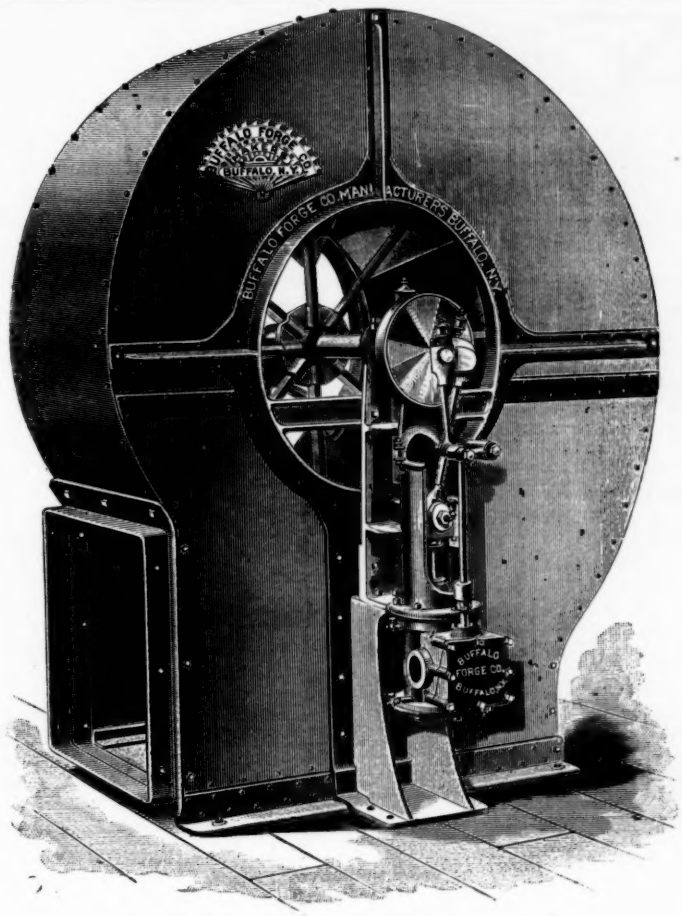
Peculiarities in the construction of the brake are noticeable; it is a very powerful hand brake.

With reference to the construction of the trucks under this style of car, there is one point which is not generally understood by the observers of foreign equipment. It is with reference to the office of the pedestals. From the end elevation these can be understood to be made of thin, flat bars of iron, with little or no lateral stiffness; yet they are rigid and of great stiffness lengthwise of the car, and this last is the purpose of their design. They are intended to keep the wheels in accurate alignment and the axles parallel to each other. But latterly they are not intended to hold the wheels in position; the carrying springs are alone intended to fulfill that function, and they are securely attached, therefore, both to the box and to the body of the car.

The capacity of this car is about 636 cubic feet, and is intended to carry either 40 men, six horses, or a load of 23,148 lbs. The dimensions of the interior are 23.5 ft. long, 6.8 ft. high and 8.2 ft. wide. The total wheel base is 13.1 ft., height of top of car from top of rail 11.4 ft. Top of caboose above rail, 13.6 ft. Length over buffers, 32.2 ft.

Fan Blower with Independent Engine.

The Buffalo Forge Co. has recently introduced a steam fan with engine directly attached to fan-shaft, as shown in the accompanying cut. This form of fan is rapidly growing in favor, facilitating the use at various speeds as occasion requires, and economizing space. The engine has a balanced valve and large bearing surfaces. It is intended to be run either non-condensing or condensing, as shall be most convenient. It is made in sizes from two to 50 horse power. When the engine is running it acts as a brace to the fan, which rests upon a steel base. In a 100-in. fan, the shaft has a diameter of 3¼ in. and is 15¾ in. long. It need hardly be added that the engine is specially designed for smooth running at high speed.



FAN BLOWER, WITH INDEPENDENT ENGINE.
Made by the BUFFALO FORGE CO., *Buffalo, N. Y.*

Railroad Spikes.

Probably more attention is given now than at any former period in recent times to the question of better fastenings for rails to ties. The increasing scarcity of timber and consequent larger use of softer varieties for ties has, no doubt, considerable influence in this direction. The result has been many suggestions as to the use of tie plates, screw bolts, and various forms of spikes. In the latter direction the greatest progress has been made, as improvements in spikes cause but little extra expense, while the use of more complicated methods of fastening is attended with sufficient expense to deter railroads from extended experiments with them. The most recent forms of improved spike, the Goldie and the Davies, have already been made familiar to our readers by illustrations in this journal, and are having such success in actual application as to already lead to their very wide use. They appear to be substantial improvements in design. The Davies is a radical departure in principle, but the Goldie is merely a modification in the way of pointing.

Most of the railroad spikes now used are made in one of two ways. One is by the automatic machine. In this process a bar of hot iron of the proper size is fed continuously into a machine so constructed that the dies that cut off the bar in its proper lengths form the taper of the point. This blank is then passed along in the machine and headed and then is discharged as a finished spike.

In the other method the spike is made by two separate machines fed by hand. The first machine heads and cuts off the spike blank squarely. This is taken by another operator while still hot and placed in another machine, which grasps it on the sides, while it is supported on a die of suitable shape, and a small wheel is brought to bear upon it, which rolls and draws out the metal so as to form a long, tapering point.

The point made by the first-mentioned method is more likely to have a sharp edge than that made by the second method; but owing to the extreme pressure necessary to cut off and draw the point down to the proper taper a side pressure is developed which tends to spread the point and side supporting dies, and thus make the point considerably wider than the body of the spike, and the metal flowing between the cutting dies and the side supports makes what are technically known as fins, or burrs, which cause the spike to drive badly, and make a wider cut in the tie than the body can fill up, leaving a space for water to enter and cause decay. Fig. 1 shows a point of this description, the dotted lines showing what should be the true point. Fig. 2 shows a point made by the second process, and while it is free from the evils of the first process, it has the objection that it cannot, from the nature of the process by which it is made, have a cutting edge. The long taper, which is usually made by this method, mitigates this evil to a certain extent, however; but this long, thin point, not having a cutting edge, but being slightly rounded, when it meets with a hard knot or similar obstruction, may turn and bend up, giving the trackman much trouble.

The principle of a cutting edge on a spike to sever the grain of the timber of the tie has never received the attention that its importance deserves. As in its final analysis, a spike, when in use, is dependent entirely for its adhesive power and value as a fastening upon the degree of compression and the completeness of the contact of its sides with the fibre of the timber of the tie, and especially with the cut ends of the fibre. The importance of having clean cut surfaces to grasp the spike thus becomes apparent. With the point of the spike in its ordinary form the grain of the timber is simply broken off and thus leaves a rough and imperfect surface to perform this important function; the surface being left in a soft and spongy condition, and but poorly adapted to resist the strong back pressure to which the spikes on the outer side of the rail are subjected. The experience of wook-working mechanics shows also that a better surface on the end grain of timber is produced by a shearing cut, than by any other method. In fig. 3 is shown the peculiar point of the Goldie spike, which severs the timber in this manner. It is simply a common spike having had its point sheared off while cold by a die in a manner which gives it a true cutting edge. Imperfections which may have been developed in the point during the first processes are removed by the shearing operation.

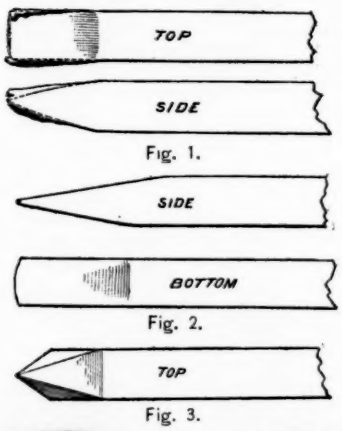


Fig. 1.

Fig. 2.

Fig. 3.

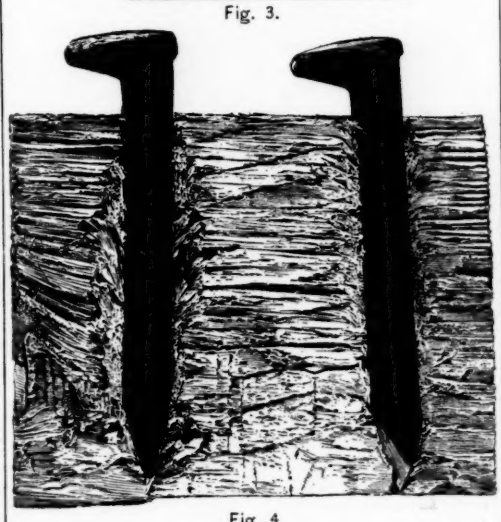


Fig. 4.

Fig. 4 shows a common spike selected as having a good point and one of the Goldie driven into a pine cross tie, the tie being then split open and faithfully reproduced in the engraving.

TECHNICAL.

The Projectcd Jungfrau Railroad.

The project for a railroad to the summit of the Jungfrau, in Switzerland, which rises to a height of about 13,670 feet, has latterly assumed more tangible shape. Two designs have been proposed, one by Mr. Moritz Köchlin, at one time connected with the building of the Eiffel Tower, and the other by Mr. Trautweiler, engineer of the St. Gothard and Brünig railroads. Of these the first is understood to have received favorable consideration.

The mountain road proper will be about 3.3 miles long. This section is to be built either on the rack system of the Mt. Pilatus Railroad, or is to be divided up into five sections of cable road, worked by water power. At the end of each of these sections the passengers will be transferred to a car on the succeeding section. A reservoir on the summit of the mountain, supplied by a series of pumps at different levels, is to furnish the required water power. Freezing of the water is to be avoided by suitable chemical additions.

Still another solution of the problem embraces the use of electricity as motive power for a rack road, power for generating the electric current being available from the various brooks descending into the valley.

Mr. Trautweiler's design provides for an underground road over the whole mountain section, thus seeking to avoid climatic difficulties. There are to be four sections of a large pipe conduit, and the power is to be furnished by means of a cable. To drive this, compressed air is to be used instead of water power. Mr. Köchlin's estimate of the cost of building the road is 9¾ million francs, while Mr. Trautweiler's estimate reaches only 5¾ million francs.

Wear of Tires.

Experiments which have been made recently on the Austrian state railroads, with wheel tires of Krupp's crucible cast steel and Martin steel, have yielded interesting results. For the purpose of the trials three wheels on one side of a locomotive were furnished with tires of one kind of steel and those on the other side with tires of the second kind. The profiles to start with were, of course, exactly alike. After two years' running, measurements of the profiles showed that the Krupp steel tires had worn down, on an average, 10 millimetres (about 0.4 in.), while the Martin steel tires had worn down 14 millimetres (about 0.56 in.).

Including the weight of metal removed in again turning down the tires to the normal profile, the weight lost, due to wear, was 40.4 kilograms (88.88 lbs.) in the case of Krupp tires, and 56.4 kilograms (124.08 lbs.) in the case of those of Martin steel.

RAILROAD GAZETTE

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EDITORIAL ANNOUNCEMENTS.

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

Advertisements.—*We wish it distinctly understood tho we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

The Union Pacific system has acquired nearly 1,000 miles of additional line by the new arrangement with the Denver, Texas & Ft. Worth. Under the new order of affairs, several branch lines of the Union Pacific in the neighborhood of Denver are to be consolidated with the Denver, Texas & Ft. Worth, and operated under a single company known as the Union Pacific, Denver & Gulf. In this company the Union Pacific will hold a controlling interest. The effect of the change upon general traffic problems will not be very great. Comparatively little through traffic from the Pacific Coast to the Gulf finds its way to Denver; while the traffic originating in Colorado was about as amicably handled under the old system as it can be under the new. Its chief importance lies in the fact that it furnishes one more instance of the tendency toward consolidation on new lines, lines which but a short time ago would have been called unnatural.

It is a little hard at this distance to tell exactly how great is the merit of the compromise on railroad rates in Iowa. Apparently the state authorities have receded from their extreme position, and the roads acquiesced in a fairer schedule which has been offered them. This is, to a great extent, a repetition of what happened 15 years ago. Just when the railroads found it impossible to invoke the aid of the courts, the laws of political economy came to their help. Just when it seemed as though the companies were most completely at the mercy of adverse legislation, the evil began to work its own cure. When Judge Brewer refused to interfere with the Commissioners' schedule, saying that the roads had better try and see whether it was so bad as was claimed, one of the Chicago papers said that it was rather heroic practice to prove poison by taking it. This method seems, at any rate, to have served its purpose in the present instance, and to have done so before anybody was killed except a few unfortunate stockholders, who sold out at the wrong time.

The freight car with iron sills, posts, carlins and trimmings, given in this issue, looks like a satisfactory design of composite car. It is the result of long experience with iron as a material for car construction on the German state railroads. It will be noticed that all parts that are liable by their shrinkage to weaken the car, or cause it to lose its shape, are made of metal. The wood is used only as a covering material. It would be interesting to compare the ratio of dead load in the body to the carrying capacity of this car, with the American cars, if the weight of the body separately was at hand. However, as the weight of the trucks is about in proportion to the total weights of the cars, a comparison of the weights as given may not be without interest. The dead weight of this car is 23,148 lbs. Its load is 22,046 lbs. Therefore the ratio of the load to dead weight is about 1 to 1.05. The American 60,000 lb. capacity freight car of good design weighs not less than 30,000 lbs. In this the ratio of the load to dead weight is 2 to 1. There is, therefore, less than half as much dead weight per total load in the fully loaded American car as there is in the German car of the design illustrated. The load per journal on the German car is 11,298 lbs., and that per journal on the American car is almost identical, at 11,250 lbs. The ratio of floor area to dead weight is about 1 sq. ft. to 120 lbs. for the German, and 1 sq. ft. to 107 lbs. for the American. The length is sometimes a governing feature of cars, and the ratio of length to dead weight may be interesting. It is 719 lbs. per foot of length for the German, and 882 per foot of length for the American. These comparisons are made between the best designs in both countries.

The so-called comparative tests of locomotives at Valparaiso, Chili, reports of which appear in another column, are rather amusing than instructive. They carry a lesson, however, for all who compete in that market for the sale of rolling stock or railroad material. The attempt to make a four-coupled locomotive with 60,000 lbs. on the drivers haul the same load up heavy grades as a mogul with 76,000 lbs. on the drivers was heroic The experimenters, however, were up to the task. They oiled the track, with the intention of sending the mogul up first. After her failure to climb a greased pole it would be easy to demonstrate the superiority of the so-called English engine. Fortunately, one of the engineers whom the commission called in to assist in the trials, and whose personal report is published in this issue, knew the resources of the country, and defeated the pretty scheme by insisting that the eight-wheeler should make the first trip. By a plentiful use of sand she ran over some 1,200 ft. of the oiled track and then stopped. It was found after the trials that the gauge of the eight-wheeler had been tampered with, and showed the steam pressure 10 pounds too low. These experimental runs prove that there are some rogues in Chili, and confirm the belief that an 18 × 24 cylinder engine, with 30 tons on the drivers, will be more likely to slip than one with 17 × 24 cylinders and 38 tons on the drivers. Further, we do not see that they prove much: and it hardly seems worth while to have made "tests" to demonstrate these facts. They do not even prove that there was a prejudice against the American design of locomotive on the part of responsible officers, for it is not shown that the oiling of rails and the tampering with the steam gauge were done by the order of, or with the knowledge of, the commissioners or any of the officers of the road. These trials appear to have been made as part of an inquiry into the relative merits of the two types of engines, four drivers coupled or six drivers coupled, for working heavy grades and sharp curves. The principal doubt appears to have been whether or not a mogul could be profitably used on curves of 600 ft. radius. The rigid wheel base of the "Victoria" was 14 ft., that of the "Mapocho" 8 ft. 6 in. To us such an inquiry seems like playing at railroading. If the Chilian officials really wish to know what can be done on mountain lines of sharp curvatures with engines of long wheel base, their cheapest way of finding out is to write to the officers of the Pennsylvania, the Baltimore & Ohio, the Lehigh Valley, the Northern Pacific, the Central Pacific and the Colorado Midland, not to mention half a dozen others. They will find curves of from 750 ft. down to 400 or less worked not only by moguls, but by consolidations; that is with eight drivers coupled. They can get data of immense traffic hauled over the grades and curves of the Rocky and the Allegheny mountains, where intense competition has developed the highest locomotive efficiency. By such correspondence they can learn more in two months than their commission can ever learn if the trials reported are a fair specimen of their method of investigation; and the cost of the lesson will be only that of stationery and postage.

A Lesson of the Year for the Northwestern Railroads.

The railroads built in 1889 have not been so situated or of such length as to make any striking changes in the course of traffic. The most important change of the year in traffic geography has been in the Northwest, consequent upon the opening of new lines in the preceding two years, and upon the development of terminal facilities at the various ports of Lake Superior and Lake Michigan. The magnitude of the changes in the course of traffic which the new routes are sure to bring is not yet appreciated. Very much of the rate troubles in the Northwest the last year has been due to these changes; and until the railroads recognize the inevitable and adjust themselves to it their troubles will continue.

The volume of Northwestern freight which has gone by the way of Lake Superior ports and Gladstone, and by the land route by the Sault Ste. Marie over the Canadian lines, the last year has been not only great enough to affect rates, but has been absolutely very large. The Eastern Minnesota last October earned $140,000 gross on 70 miles, with an average rate of three-quarter cent per ton-mile. This is at the rate of $24,000 per mile per annum, gross earnings. This is a heavy trunk line business. In 1888 the United Railroads of the New Jersey Division of the Pennsylvania earned $35,700 per mile, gross, on an average rate of 1.22 cents: the Pennsylvania Railroad Division earned $22,700 per mile, average rate, 0.63 cent: the New York Central & Hudson River earned $23,800 per mile on a rate of 0.77 cent, and the Boston & Albany, $22,900 per mile, rate 1.08 cents. We do not predict that the average of this year's operations or of next year's will show on the Eastern Minnesota gross earnings of $24,000 per mile, although such a result next year does not seem improbable; but these figures indicate the magnitude of the business going to the ports at the west end of Lake Superior. The freight tonnage through the Sault Ste. Marie Canal in 1889 was 7,516,000 tons, an increase of 15.7 per cent. over 1888.

But this is only one element in the situation. In the first 10 months of this year the Minneapolis, St. Paul & Sault Ste. Marie took out of Minneapolis 25 per cent. of the total flour and mill stuff shipped from that place. Much of this went by way of Gladstone, and then east by lake. We are told that the westbound trains of the road were well loaded with lumber, coal and general merchandise. This line has, of course, a winter route by rail through Canada to Northern Atlantic ports.

We give these facts merely as suggestions of the actual or impending changes in the course of traffic. They show clearly that Chicago is no longer the only gateway to the Northwest. That the relative importance of the northern lines will increase rather than decline is probable, and, indeed, we may say certain. That they will compete strongly for business as far south as the latitude of Omaha a glance at a map will show. It will be seen that Duluth is nearly 250 miles west of Chicago, and yet no farther from Buffalo by lake. Gladstone, in about the same longitude as Chicago, is some 260 miles nearer to Buffalo by lake. From Gladstone to St. Paul is 341 miles; from Chicago to St. Paul is 410 miles by the shortest rail route, and from Duluth to St. Paul is 152 miles by the St. Paul and Duluth, and a little over 200 miles by the Manitoba and the Eastern Minnesota. For all lake and rail traffic to and from the Northwestern country that lies near the latitude of Duluth, and for that of which St. Paul and Minneapolis are the natural centres for collection and distribution, the Chicago lines are at a disadvantage so far as distance goes. Even for the Omaha business Chicago has little advantage in distance. The shortest line from Chicago to Omaha is 490 miles. From Duluth to Omaha it is 520 miles. The people of the northern cities and lake ports and the roads most interested are confident of diverting from Chicago an ever-increasing part of the trade of the Northwest. That their confidence has a reasonable basis we have seen. The obvious moral is to so strengthen the traffic associations that the business may divide on natural and rational lines without useless rate wars. How hard it is to carry out this simple suggestion the experience of the year has shown; but the first essential step is to recognize the new facts in the geography of transportation.

Private Stock Cars.

The trunk lines apparently feel pretty well satisfied with the disposition they have made of the private stock-car question. With one or two exceptions the roads have succeeded in excluding all such cars from their regular traffic and the exceptional roads have not a large number in use. The stronger roads are probably satisfied to tolerate a small evil rather than make a fight which would draw increased attention to the subject. This question has received a good deal of attention and is one whose importance warrants careful inquiry. It illustrates the importance of the general question of car service rates, for the long-settled practice of paying a fixed rate on all cars borrowed, and that a rate founded on an illogical basis, is at the bottom of the abuses that have now grown up and which make it necessary for prudent managers to fight against the use of private owners' cars. The same evil is connected, though in a less degree, with the use of refrigerater cars owned by the beef shippers. The payment of high mileage rates aggravates the wrong, but with regular rates it is bad enough.

The motive actuating the trunk lines is simply to stop borrowing cars at unreasonably high rates, though

a weak line that favors private cars is not necessarily actuated by improper motives. If it takes a short-sighted view it can claim to be making a legitimate concession to shippers. It is for its immediate self-interest to secure traffic even at a considerable reduction of rates, which the borrowing of stock cars from shippers, directly or indirectly, at high prices, really amounts to, but the payment of exorbitant mileage rates is certainly against public policy, and in the long run it is against the road's own interest. It makes the cost of transportation unnaturally high, and at the same time tends to conceal the fact. Roads have, indeed, in many cases carried large quantities of freight at cost, and even less, for the sake of making shippers acquainted with their lines, with the hope of afterward securing remunerative traffic by more legitimate inducements; but no one is warranted in continuing such a policy any great length of time. If it does not achieve its purpose quickly, it is of very doubtful value.

The one legitimate reason for the use of private cars is to get the advantage of their patented facilities. It is proper to feed and water animals while they are on the cars, if this will relieve distress and thus promote the humane treatment of live stock in general; though it does not appear that any great improvement in this direction generally results. Private cars, where run, have been put in service for the sake of drawing business and for various other reasons, but the use of stock yards does not seem to have been abolished to any appreciable extent. The improvement of the quality of the meat by reason of the more comfortable condition of the animals is an argument in favor of "palace" cars; but, practically, the older roads with their ample facilities in the way of stock yards seem to have no difficulty in holding their own, so far as the delivery of cattle in good condition is concerned. At least there are large shippers who seem to honestly prefer common cars.

The general use of cars owned by a private concern for this or for any traffic might make a given stock of cars available for a larger number of roads or a larger extent of territory, but this advantage would very likely be offset by other considerations. The use of box cars in line service is hardly a parallel case because they are kept mostly on a few affiliated roads, and even if it were, the question of equitable rates would still be unsettled. If there is a positive demand for feeding and watering facilities in cars the railroad companies can afford to pay a good royalty on the feed trough and other appliances to be placed in their own cars.

As long as it is impossible to modify the existing unjust system of paying for interchanged cars, the fitting up of railroad companies' cars would be the most reasonable way of meeting such a demand.

There is so much general ignorance or thoughtlessness on this subject that fallacious arguments tending to show that the private cars now running are not costly to the roads receive more countenance than they should. The whole subject of lending and hiring cars has been so long at loose ends, that people accept, or pretend to accept, the most absurd statements. The Car Accountants' Association has shown that the average trip of freight cars is 24 miles a day, and from this it is reasoned that the income of a car lender must be 18 cents per car per day; but a little inquiry at once reveals the fact that this average is made up of a combination of very low and very high rates. Every one knows of cars which stand idle so much that for months at a time they do not earn interest on their cost, and it is also familiar knowledge that some cars in line service, like those of the Merchants' Despatch Transportation Co., have for years been very profitable. By keeping cars in long-journey service they will earn large sums at 7½ mills a mile. Enterprising lenders know enough to lend cars for use in profitable service, leaving the unprofitable lending to be done by railroad managers who try to borrow enough other cars—at a loss to some other lender—to conceal the loss on their own cars. As an illustration of profitable lending we may cite the following figures, which were taken from an actual record. On one of the trunk lines a lot of several hundred stock cars belonging to a shipper were run in one line for an extended period. For 12 months, during which these cars took their chances of seasons of light traffic the same as other cars, the income of the owner at ¾ cent a mile was $278.65 per car per annum, equal to 56 per cent. on a valuation of $500 per car. Ordinary running repairs were made by the railroads. It is plain enough to see why that shipper would desire to use Smith's or Brown's patent car, provided he owned the cars, or Smith or Brown gave him a share of the profits for his "influence" with the railroad officers.

Buying the same car over again every two years, and still leaving it in the first owner's hands, is expensive business. It is as bad as paying ticket commissions and affords a precisely similar means for manipulating rates. The requirements of the Interstate Commerce Law cannot prevent rate cutting if such an easy method of increasing and decreasing the price of the service to the actual consumer is left available. The Chicago & Alton's lease of stock cars to a private company was annulled when its real nature was fully exposed to the road's competitors. It will be well if the sensible views of the Alton managers are shared by those of other roads. It is a well-settled principle that a railroad should own the cars in which it carries freight. The methods adopted in the interchange of cars have often resulted in the violation of this principle, though on the whole there has been a genuine attempt to maintain it. It is to be hoped that the adoption of rational methods of payment for borrowed cars, whether they be owned by railroads or private parties, and prompt introduction of all improvements in cars which are legitimately demanded by shippers, will be recognized as necessary to the maintenance of this principle, and, therefore, made the aim of railroad managers. The practice of borrowing and lending is an element of instability and there are enough such elements in freight traffic already.

The Grand Central Yard.

We publish this week a diagram of the yard at the Grand Central Station in New York City, which is used by the New York Central & Hudson River and the New York, New Haven & Hartford roads. The business of these roads is rapidly increasing and a radical reorganization of the tracks or buildings, or both, will be necessary in the near future. The public constantly complains of delays and inconvenience and would have ground for much stronger complaints than those generally made. But outward and inward trains are delayed by switching movements in the busy hours of morning and evening every day, and the acquisition of more land or a better use of that now possessed is already a necessity. While the tracks are close together and the number of crossovers is perhaps ample, the actual number of passenger trains run is not large for the space occupied by the station. The number of signal movements is very great, because considerable unnecessary switching has to be done by the engines getting to their trains and by the shifting engines in getting trains into the station.

The difficulties to be overcome are various. Few, if any, of the trains can go out with the cars in the same order—or rather in precisely the reverse order—that they came in. Consequently every train has to be hauled out and switched. The great amount of business done in the busiest yards of the world is made possible largely by the discharging of passengers and reloading the same cars with another set without moving the cars from one track to another. The "annex" to the Grand Central train shed being used exclusively for inward trains, the running of trains in this way could be made only a partial remedy, as inward trains could be run, to only a small portion of the outward platforms. The engine houses, whose location is shown in the diagram by the word "turn-table," are in a very cramped position. Many of the engines now go to Mott Haven, five miles out, but the two-mile tunnel adjoining the yard necessitates the constant use of the absolute block system, so that engines cannot be sent out singly without soon filling the main track to the limit of its capacity. This makes it desirable to have sufficient shed room for engines adjoining the yard. Two or three hundred cars are now taken to Mott Haven daily for lack of storage tracks. This is objectionable for the reasons just mentioned, and for the added reason that it is expensive to haul empty cars at high speed such long distances.

The location of the waiting rooms for both the main line and the Harlem division of the New York Central on the west side of the building, instead of in the south end (where the New Haven waiting room is, and where all should be), is a bad plan, and the work of loading trains at the two former has to be constantly done at a disadvantage. Not over two tracks can be used with any convenience, and so far as these rooms are concerned, the station is really not a head-house, but a wayside building. The supply of storage tracks being insufficient and the trip to Mott Haven being a long one, the tracks in the station are used for storing a good many empty cars in the middle of the day, and this is a large factor in making the amount of necessary switching very great.

It will be seen that relief must come mainly from one or two directions. The waiting rooms can be all placed at the end of the building, thus making all tracks available for all of the rooms, and additional storage tracks can be laid. The acquisition of more land is a serious question, because of the high value of real estate in that locality, but it seems to be the only radical remedy available. A system of overhead tracks is quite feasible, but it would be very expensive unless the yard were first enlarged. The shape of the yard is such that access to such tracks could be easily had without a lift, if more land were taken, but this would involve the discontinuance of one or two transverse streets, several transverse foot bridges and a portion of Fourth avenue, which lies parallel to the railroad on the east side. A considerable portion of the ground on the east side, which is imperatively needed for passenger service, is already laid with tracks, but is used for milk, ice and other freight traffic. The people of New York City are vitally interested in having free and convenient access by these railroads to and from the city, and the necessary and proper closing of streets should be cheerfully granted; but in giving the use of such valuable property for railroad purposes it should be insisted upon that the premises be used exclusively for passenger traffic. By the use of the streets mentioned and of the tracks now used for freight, with the purchase of two or three pieces on adjoining property, the yard on the east side could be greatly enlarged, and the cars of emptied, inbound trains could be placed there without crossing the other yard tracks. This yard could readily be covered with a structure for supporting overhead tracks; this could be done without moving the present roundhouses, but it would be better to depress these. Access to these overhead tracks could be had by a moderate incline, if right of way could be had as far back as Fifty-third street (about 1,600 feet north of the north end of the train shed), and an overhead crossover could be run from this elevated yard to the storage tracks on the west side of the yard.

The New York Central now controls the station, the former division of control into thirds being upset by the New York Central's lease of the Harlem. Its officers are considering the remedies, and will probably begin to put one of them into execution the coming spring. The change in the station building will be the cheaper, of course, and will probably be adopted. If both the roads would arrange to run a portion of their trains in and out without switching them, and would run engines without turning them around, the yard would be relieved materially, but it would be a short-lived relief after all. The number of trains here is so great that, even with a considerable amelioration of the conditions, the yard movements would still be very heavy. Engines are flying around in so many directions that injuries to employés are somewhat frequent, and no financial obstacle should stand in the way of a substantial abatement of the confusion now existing. In one sense the word "confusion" is inapplicable, for it is remarkable that so many thousand switching movements are made in such small space with such immunity from accidents. But where old and experienced employés have frequently to be whistled at by engineers to make them clear the track, the strain on the men's mental faculties is too great. A very few seconds' forgetfulness on the part of an engineer may sometime overturn a car full of passengers; and it is therefore a duty to simplify the arrangement of tracks to the highest degree possible.

Compound Locomotive Studies in France.

M. Henry, the Engineer in Chief of material and rolling stock of the Paris, Lyons & Mediterranean Railroad of France, and his assistant, M. Ch. Baudry, have made a special study of compound locomotives for use on that road, and the following is a brief statement of the results of their labors and the conclusions which they have drawn. Early this year, after various consultations and experiments, they put into service three new types of compound locomotives having four cylinders each. One type is for high speed express trains, another for freight trains on level lines and for mixed trains on lines having small grades, and the third for passenger and freight trains on heavy grades. These engines have the following characteristics in common. A boiler pressure increased to 213½ lbs. per square inch; steel boiler plates—an innovation in France—the admission of steam to two high-pressure cylinders between the frames, which are connected by rods to the first, second or third driving axle, according to the type; the further expansion of the steam in two low-pressure cylinders outside of the frames, these cylinders being connected to other wheels than those which the high-pressure cylinders drive; all wheels connected by means of parallel rods; the distribution of the steam by means of the Walschaert valve gear; the adjustment of the ratio of expansion in the cylinders independent of the action of the engine runner, such ratio being determined by the chief engineer; the admission of high-pressure steam to the low-pressure cylinder only at starting. So far, these locomotives have not been tested a sufficient length of time to warrant the publication of the results; but the chief engineer and his assistants have drawn the following conclusions regarding them:

"These locomotives are good, and they are found to be more powerful and more economical than the non-compound types from which they were derived. They are, it is true, heavier, but their detrimental effect on the rails is lessened by reason of the essential features of design, which prevent oscillations of the locomotive, which result from the inertia of reciprocating parts and the obliquity of the connecting rods."

In studying these new types of locomotive, the main object had in mind was the saving in fuel, and it was, therefore, decided that it would be indispensable to increase in a large proportion the pressure of the steam in the boiler when adopting the compound system. These engineers state:

"The compound system, it is true, will result in increased economy without an increase in boiler pressure, but the advantage gained by simply compounding might be disputed. With a pressure of 125 to 150 lbs. per square inch, it is hardly necessary to resort to the compound system. However, the use of such system would considerably diminish the loss due to condensation in the cylinders; but this is also somewhat reduced when there

is high speed of pistons. In any case, the economy which would result at the pressures just mentioned would not suffice to compensate for the complication of mechanism which the supplementary cylinders demand."

It must be borne in mind in reading this statement that the locomotive to which this applies has four cylinders, four main rods, complete sets of parallel rods, and two sets of Walschaert valve gear, which in itself has many parts. With regard to high pressures, the conclusions reached are as follows:

"A little more coal is used to heat the steam, but the pressure is much increased in proportion, and the gain in work is considerable when the steam is properly expanded; but high grades of expansion are not advisable in a single cylinder with any mode of steam distribution practicable in locomotives, and the wide variations in temperature considerably increase the cylinder condensation. For these reasons the compound construction must be used when higher pressures are adopted for locomotives."

In short, the officers of the Paris, Lyons & Mediterranean Railway find that the compound locomotives of their design are too complicated to warrant their use without a considerable increase in steam pressure, and believe that the advantages to be gained in compounding locomotives when the boiler pressure is below 156 lbs. per square inch are not sufficient to offset the disadvantages of the increased complication of their designs. This would hardly be true of other designs of compounds in which the details incident to the compound features were less numerous. The reports giving the deductions of these engineers bear the stamp of careful, honest investigation, and their views are therefore worth the attention of American engineers.

November Accidents.

Our record of train accidents in November, given in this number, includes 75 collisions, 73 derailments and 3 other accidents; a total of 151 accidents, in which 42 persons were killed and 167 injured.

These accidents are classified as follows:

COLLISIONS:		
Rear	37	
Butting	21	
Crossing and miscellaneous	17	
		— 75
DERAILMENTS:		
Broken rail	7	
Loose or spread rail	2	
Broken bridge or trestle	4	
Defective switch	3	
Broken wheel	2	
Broken axle	5	
Broken truck	1	
Broken car	2	
Loose wheel	1	
Misplaced switch	2	
Runaway engine	1	
Careless running	2	
Bad switching	1	
Cattle on track	4	
Snow	1	
Washouts	2	
Landslide	6	
Accidental obstruction	1	
Malicious obstruction	1	
Unexplained	25	
		— 73
OTHER ACCIDENTS:		
Miscellaneous	3	
		— 3
Total number of accidents		151

The causes of collisions, where given, were as follows:

	Rear.	Butting.	Crossing and other.	Tot'l.
Trains breaking in two	7	..	..	7
Misplaced switch	3	1	2	6
Failure to give or observe signal	4	..	..	4
Mistake in giving or understanding orders	..	3	..	3
Miscellaneous	8	..	6	14
Unexplained	15	17	9	41
Total	37	21	17	75

A general classification shows:

	Collisions.	Derailments.	Other.	Total.	P. c.
Defects of road	..	16	..	16	11
Defects of equipment	7	11	2	20	12
Negligence in operating	27	6	..	33	22
Unforeseen obstructions	..	15	1	16	11
Unexplained	41	25	..	66	44
Total	75	73	3	151	100

The number of trains involved is as follows:

	Collisions.	Derailments.	Other.	Total.	P. c.
Passenger	23	24	3	50	23
Freight and other.	121	49	..	170	77
Total	144	73	3	220	100

The casualties may be divided as follows:

KILLED.	Collisions.	Derailments.	Other.	Total.	P. c.
Employés	16	23	..	39	94
Passengers	..	2	..	2	4
Others	1	..	..	1	2
Total	17	25	..	42	100
INJURED.					
Employés	53	35	2	90	54
Passengers	19	54	..	73	44
Others	2	2	..	4	2
Total	74.	91	2	167	100

The casualties to passengers and employés, when divided according to classes of causes, appear as follows:

	Pass. killed.	Pass. injured.	Emp. killed.	Emp. injured.
Defects of road	..	39	9	7
Defects of equipment	1	..	2	4
Negligence in operating	..	19	17	58
Unforeseen obstructions and maliciousness	..	..	10	14
Unexplained	1	15	1	7
Total	2	73	39	90

Thirty-one accidents caused the death of one or more persons, and 43 caused injury but not death, leaving 77 (51 per cent. of the whole) which caused no personal injury worthy of record.

The comparison with November, 1888 and 1887, shows:

	1889.	1888.	1887.
Rear collisions	37	40	52
Butting "	21	21	19
Crossing and other collisions	17	10	9
Derailments	73	70	48
Other accidents	3	4	4
Total "	151	145	125
Employés killed	39	25	38
Others "	3	13	5
Employés injured	90	106	87
Others "	77	73	18
Passenger trains involved	50	51	36
Average per day:			
Accidents	5.03	4.83	4.17
Killed	1.40	1.27	1.43
Injured	5.56	5.97	3.50
Average per accident:			
Killed	0.278	0.262	0.344
Injured	1.105	1.233	0.480

The number of passengers reported killed in November (two) was much below the average for the year, and one of these was in a caboose. The only fatality in a passenger car was that at Pittsburgh, the 18th. It appears that the burning coals from the fire in the heater were the immediate cause of the death of this passenger. The cause of the derailment has not, we believe, been ascertained. It occurred at or near a frog in an interlocking system, but a searching investigation has failed to show any defect in either the cars or the track. An incidental advantage of the pneumatic interlocking system was shown in this case. The switch connections, being entirely under ground, were wholly uninjured, though the wreck was such that ordinary rod and wire connections would inevitably have suffered much injury.

The next most important accident, though not the next in fatality, was the rear collision at Rahway, N. J., on the 28th, where an engineer ran past a block signal. We are not acquainted with this locality, but the case is a reminder of the fact that the Pennsylvania has very few of its block stations provided with distant signals. Rahway has been an unlucky place lately, and a New York paper says, in its perfunctory way, that the occurrence of four accidents at the same place within six weeks must certainly indicate that "a screw is loose somewhere." This is doubtless true, and the section master who failed to use proper precaution in repairing the track there in October, as well as the engineer who was careless in the present case, would doubtless be found to be below the very highest standard of intelligence and skill; but the fact that a wreck spreads itself over adjoining tracks, and that a train in the opposite direction happens along on one of those tracks at just the right moment to meet disaster, can hardly be characterized as the mere loosening of a screw. Our whole system of double tracks will have to be changed before this element of danger can be eliminated, and "loose screws" of various degrees of danger can be found much more readily in other places than on a four-track road equipped with block signals.

The extraordinary collision at Gallitzin on the 8th was described in the *Railroad Gazette* of Nov. 15. So long as heavy freight trains with a minimum number of brakemen are run on such steep grades, the possibility of exciting incidents like this will always exist. This should be an incentive to vigorous efforts towards the adoption of air brakes, for it is hardly practicable to place upon freight trains a sufficient number of brakemen to quickly control a long train on a steep grade. The conductor in this case might perhaps have called upon the fireman for assistance sooner than he did, but it is not to be expected that the average freight conductor will have the force of character necessary to promptly exert his authority to its extreme extent as is necessary in such an emergency.

On Nov. 9 a train of the Brooklyn Elevated broke in two on an ascending grade at Washington avenue, and the two rear cars started down the hill. Another train was following, and the brakeman had none too much time to prevent a collision. A number of passengers jumped off upon the station platform at great risk, and others became panic stricken, but no one was hurt. The elevated roads both in New York and Brooklyn use a non-automatic train brake, and the safety of the passengers and their human freight depends in case of a break-in-two upon the promptness of the brakemen. The Manhattan has run many millions of train miles with no disaster from this cause, and its long immunity, coupled with the high state of discipline maintained, doubtless justifies it in using a non-automatic brake. Where stops are very numerous, and the number of cars and engines moved is very large, the simplicity and low cost of the simple vacuum, and the much greater facility with which the speed of trains can be graduated by it, as compared with an automatic brake, constitute a marked advantage; but only where draw-bars of the very best material and design are used, supplemented by stout safety chains, kept constantly in use by the strictest discipline, can the practice be regarded as safe. The constant presence of a brakeman at every brake which is necessary for discharging and loading the passengers, is also a source of confidence. With the Manhattan's almost perfect drawbars the first dangerous parting of a train may be far in the future; but notwithstanding this, the non-automatic brake would be hardly justifiable without the brakemen.

The close of lake navagation has caused a sudden increase in the movement of freight toward the seaboard, especially of grain, and the railroads, which were already moving a heavy traffic, are hard pressed by the increased demands upon them. At Chicago the eastbound roads are unable to move the cars as fast as the western roads deliver them. The amount of corn sent to Baltimore, which was foreshadowed several weeks ago by the closing of contracts west of the Mississippi, and of others at Baltimore with vessels, has now become very heavy, and the Baltimore & Ohio has been taxed to its utmost, being obliged to transfer engines from one division to another to get the cars over the road. New York grain dealers complain of the diversion of corn shipments from New York to Baltimore, and it is alleged that Baltimore dealers and elevator lessees make unreasonable reductions in charges for storage and commission, which reductions are made up to them by the railroads. No direct charges are made, but this state of things is plainly hinted at in connection with both the Pennsylvania and the Baltimore & Ohio. The New York lines are, however, overtaxed with other freight, and there is an immense supply of corn in the West and a good demand in Europe, so that the movement by the less favorable routes may be regarded as legitimate. The Kansas City, Fort Scott & Memphis has made an all-rail rate on corn from Kansas City to New Orleans, via Memphis and the Louisville, New Orleans & Texas Pacific, of 22 cents per 100 lbs. It is stated that contracts have been made for a million bushels of grain to New Orleans, 800,000 bushels to Savannah and Brunswick and 700,000 bushels additional to New Orleans over the Illinois Central. These amounts aggregate about 4,000 cars. The roads leading to the south are just at present blockaded, but it is not stated how long a time it is expected to occupy in carrying out these contracts.

The collection of a proper charge for detention of freight cars is now receiving careful attention at a great many points. The Committee of the Central Traffic Association has prepared rules for putting demurrage in force at all points not already covered by car service associations. Coal, coke, iron ore and limestone are given 96 hours free. The Indiana Car Service Association has chosen D. T. Bacon general manager. He will have 15 men, and have jurisdiction over 143 junction points. At the organization of this association it was stated that the average number of cars of bituminous coal standing at Chicago had been reduced from 3,700 to 600. A few weeks ago the Chicago Association had one of its most trying experiences since it was organized. In one day nearly 600 carloads of potatoes arrived in Chicago from the Northwest, and the dealers pleaded for an extension of time, but the Association was relentless, and the owners of the potatoes sold them at fair prices. At St. Louis the hay dealers used to have 1,200 carloads standing at times, of which none was sold. This year they have been compelled to abandon this practice, and there has been no glut in the hay market as formerly. A car service association has been formed at Memphis, to go into effect Feb. 1. E. A. Thurston is manager. The Columbus Association has effected an average daily decrease in standing cars of 800. The New England roads have just made an important modification, changing the free allowance from 48 hours to 96. It is stated that Connecticut has passed a law touching upon the matter.

The preliminary statements of the Lake Shore for 1889 show an increase in profits with a reduction in net earnings. The figures are as follows:

	1888.	1889.
Gross earnings	$18,029,627	$19,475,000
Operating expenses and taxes	11,310,371	12,833,859
Net earnings	6,719,256	6,641,141
Fixed charges	3,608,391	3,425,000
Profit for year	3,110,865	3,216,141
Dividends (5 per cent.)	2,473,325	2,473,325
Surplus	637,540	742,816

This somewhat anomalous fact is due to the policy of the company in keeping down its capital account, by which fixed charges have been reduced instead of increased. It is this which has enabled the road to maintain its value so well while most other roads have been doing badly. That the Lake Shore owes its immunity from trouble to skillful management rather than to fair weather may be seen by comparing the figures for 1889 with those of 1887.

	1889.	1887.	Inc. or dec.
Gross earnings	$19,475,000	$18,710,963	+$764,037
Oper. expen	12,833,859	11,029,798	+1,804,061
Percentage of earnings	66	59	.....
Net earnings	$6,641,141	$7,681,165	—$1,040,024

Of course a part of this unfavorable percentage may be due to changed methods of accounting; but the probability is that it is nearly all due to new conditions of traffic, by which a larger volume of business—much of it local business—is done at lower ton-mile rates.

In a lecture delivered last year at the training school for boiler attendants at Berlin, Germany, attention was directed to the fact that in some boilers of recent design the upper surfaces of the flues were fitted with a kind of baffle plate, the idea being to break up and deflect the current of the gases and thus to better utilize the heat. It is of some interest to note, therefore, that more recently experiments have been made in Germany with a similar, modified arrangement of furnace flues, and apparently with very satisfactory results. The flues were provided inside with two rings of fire brick; one near the bridge wall and the other some distance further back. The trials are said to have shown a reduction in the smoke and a saving in coal of something like 17

per cent. This figure would appear to be extraordinarily high, but as the fitting up of the flues with the fire-brick rings entails little expense, further trials might be readily instituted with the promise of obtaining some interesting and valuable data from those boilers having extraordinarily large flues. A saving such as that reported could not be had except from boilers having small flue heating surface, consisting of a few tubes of large diameter.

Locomotive Boiler Tube and Rivet Table.

In this issue is given a table which will be found useful in the location of boiler tubes and rivets. This table was computed by the aid of a calculating machine made by the Felt & Tarrant Manufacturing Company, Chicago, Ill. All the results have been calculated three times, and are accurate to four places of decimals. The method of using this table is as follows: The verticals at the sides of the table are the distances between rivets or tubes in rows. The diagonals at the top and bottom of the table are the distances diagonally between tubes or rivets in different rows, as shown by the small diagram in the lower left hand corner of the table. The figures in the table give the distances between rows for the different diagonal and vertical spacing. For example, locomotive boiler tubes that are placed 2¼ in. apart in the vertical rows and 2¾ in. centre to centre on the diagonal, must be placed in rows 2.4494 in. apart. If the distance between rows is given and the diagonal spacing is desired, the vertical spacing being known, proceed as in the following example: Given distance between rows 2.6 in., vertical spacing 2.5 in., required the distance apart of the tubes on the diagonal. On the line of 2½ in. vertical at the side of the table will be found 2.5890 as the nearest distance between rows to 2.6. From this point in the table proceed vertically, and it will be found that the distance on the diagonal is 2⅞ in.

The Origin and Method of German Railroads—With Special Reference to Rates and Classification.

The year 1838 marks the beginning of the era of railroad building in Germany. The German lines were not laid out on any comprehensive system, as the French railroads were; but with more regard for the local than for the general interests of the country. This is traceable to the composition of Germany. At the time most of the roads were laid out, Germany was a loose federation of a great many states. Each state had almost exclusive control of everything within its borders; and one can readily see how each state built its railroads with little thought of any advantage to be derived from better communication with neighboring states.

Prussia being the largest and most important German state, we will consider her as a type, and trace the development of railroads there, and the methods of consolidation. Under the law of 1838, the Prussian Railway Code, a Council of Trade was created. The projectors of every railroad were required to lay before this council the amount of capital proposed to be raised, and full particulars of the projected line. The line must then be approved by the council, which specified also the conditions of construction and the kind of vehicles to be used. If a company wished to issue more stock than they had originally asked for, they had to petition the Parliament for permission. All loans had to be sanctioned by Parliament, and it always required a fund to be set aside for paying the interest and redeeming the loan. The companies had the right to buy land without the consent of the state authorities; but if they wished to sell it again, that consent must be first obtained. When differences arose with landowners about the price of land, the companies could appropriate it, subject to the approval of the same authorities. The latter selected appraisers, who conducted a valuation in presence of both parties. If an owner was dissatisfied with an award, he could obtain a judicial verdict; but no appeal was open to the railroad. The act also required the railroads to pay a tax proportioned to the profits on the total subscribed capital. The running expenses, cost of keeping up the road, and the amount which goes to the reserve fund are first deducted from the profits, and then the tax is proportioned to the balance. The reason of this tax has been accounted for by the fact that the railroads pay no trade taxes, and this graduated tax indemnifies the state for its loss. The proceeds of it are also devoted toward a redemption of the capital in the undertaking. There is still another tax—an income tax. It is a tax on the net profits on the share capital, after deducting running expenses, etc., reserve and renewal funds, interest and sinking fund. The following is the rate of income tax:

When net profits amount to 4 per cent., the income tax is $\frac{1}{10}$ per cent. thereof.

When net profits amounts to over 4 per cent. or 5 per cent., the income tax is $\frac{1}{5}$ per cent. thereof.

When net profits amount over to 5 per cent. or 6 per cent., the income tax is $\frac{1}{10}$ per cent. thereof.

When net profits amount to over 6 per cent., the income tax is $\frac{2}{10}$ per cent. thereof.

The state must apply the proceeds of this tax to buying in the open market the shares of the company which pays it. The interest and dividends on the shares thus bought must be used in the same manner as the tax. These shares must be deposited in the National Debt Office of the state, and thereby the state gradually gets control of the railroads.

The act contained many regulations in regard to charges for passengers and goods. For three years after the passage of the act of 1888, the railroads had the right to regulate the

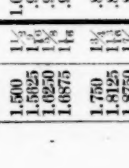
Computed by the Felt & Tarrant Comptometer.

TABLE FOR SPACING BOILER TUBES AND RIVETS.

DIAGONALS.

VERTICALS.

Inches.	1¼	1⅜	1½	1⅝	1¾	1⅞	2	2⅛	2¼	2⅜	2½	2⅝	2¾	2⅞	3	3⅛	3¼	3⅜	3½	Inches.
1.250	1.0825	1.1541	1.2247	1.2945	1.3635	1.4320	1.5000	1.5675	1.6345	1.7013	1.7677	1.8339	1.9000	1.9655	2.0310	2.0963	2.1614	2.2264	2.2912	1.250
1⅛	1.0638	1.1366	1.2088	1.2780	1.3488	1.4180	1.4865	1.5545	1.6223	1.6865	1.7504	1.8229	1.8892	1.9553	2.0211	2.0867	2.1521	2.2174	2.2825	1⅛
1¼	1.0439	1.1180	1.1907	1.2624	1.3351	1.4031	1.4722	1.5411	1.6093	1.6770	1.7444	1.8114	1.8781	1.9445	2.0106	2.0766	2.1425	2.2079	2.2733	1¼
1⅜	1.0227	1.0981	1.1721	1.2449	1.3165	1.3873	1.4574	1.5267	1.5956	1.6638	1.7317	1.7992	1.8663	1.9332	1.9996	2.0660	2.1321	2.1979	2.2636	1⅜
1.500	1.0000	1.0770	1.1523	1.2263	1.2990	1.3707	1.4415	1.5116	1.5811	1.6500	1.7184	1.7861	1.8540	1.9213	1.9882	2.0549	2.1213	2.1875	2.2534	1.500
1⅝	.9777	1.0546	1.1314	1.2067	1.2804	1.3531	1.4248	1.4957	1.5659	1.6354	1.7044	1.7729	1.8410	1.9087	1.9761	2.0432	2.1100	2.1765	2.2428	1⅝
1½	.9549	1.0307	1.1092	1.1858	1.2608	1.3346	1.4072	1.4790	1.5499	1.6201	1.6897	1.7589	1.8275	1.8957	1.9635	2.0310	2.0981	2.1650	2.2317	1½
1⅝	.9222	1.0052	1.0856	1.1637	1.2400	1.3151	1.3887	1.4614	1.5331	1.6041	1.6744	1.7441	1.8132	1.8820	1.9505	2.0182	2.0857	2.1531	2.2200	1⅝
1.750	.8926	.9782	1.0606	1.1405	1.2183	1.2945	1.3692	1.4429	1.5155	1.5872	1.6583	1.7286	1.7984	1.8676	1.9365	2.0048	2.0728	2.1405	2.2079	1.750
1¾	.8800	.9604	1.0340	1.1059	1.1762	1.2452	1.3128	1.3792	1.4450	1.5096	1.5741	1.6414	1.7124	1.7828	1.8527	1.9220	1.9909	2.0594	2.1275	1¾
1⅝	.8567	.9185	1.0038	1.0877	1.1700	1.2500	1.3272	1.4031	1.4776	1.5512	1.6238	1.6955	1.7666	1.8371	1.9070	1.9764	2.0453	2.1139	2.1821	1⅝
1.875	.7889	.8855	.9757	1.0620	1.1451	1.2259	1.3046	1.3817	1.4573	1.5318	1.6053	1.6779	1.7497	1.8208	1.8913	1.9611	2.0307	2.0997	2.1684	1.875
2.000	.7500	.8500	.9437	1.0326	1.1180	1.2005	1.2808	1.3592	1.4360	1.5110	1.5860	1.6594	1.7320	1.8038	1.8750	1.9455	2.0155	2.0850	2.1541	2.000
2⅛	.7061	.8117	.9068	1.0013	1.0891	1.1737	1.2558	1.3356	1.4136	1.4904	1.5658	1.6402	1.7136	1.7861	1.8577	1.9291	1.9997	2.0698	2.1394	2.0625
2¼	.6584	.7705	.8727	.9682	1.0588	1.1456	1.2295	1.3110	1.3905	1.4684	1.5449	1.6201	1.6943	1.7677	1.8403	1.9121	1.9833	2.0539	2.1240	2.1250
2⅜	.6051	.7255	.8332	.9327	1.0295	1.1158	1.2018	1.2850	1.3660	1.4452	1.5230	1.5992	1.6743	1.7485	1.8218	1.8943	1.9662	2.0374	2.1081	2.1875
2.250	.5448	.6700	.7005	.8048	.9021	1.0843	1.1726	1.2577	1.3404	1.4211	1.5000	1.5772	1.6535	1.7286	1.8027	1.8760	1.9483	2.0204	2.0916	2.1622
2⅛	.4749	.6210	.7441	.8541	.9555	1.0509	1.1418	1.2291	1.3136	1.3957	1.4760	1.5546	1.6318	1.7079	1.7828	1.8569	1.9301	2.0026	2.0745	2.1458
2½	.3903	.5590	.6831	.8100	.9164	1.0155	1.1092	1.1989	1.2854	1.3693	1.4510	1.5309	1.6089	1.6863	1.7622	1.8370	1.9111	1.9842	2.0568	2.1288
2⅝	.2777	.4871	.6066	.7022	.8744	.9777	1.0748	1.1671	1.2558	1.3415	1.4248	1.5061	1.5855	1.6638	1.7407	1.8165	1.8913	1.9652	2.0384	2.1100
2.500		.4001	.5728	.7008	.8201	.9375	1.0383	1.1336	1.2247	1.3125	1.3975	1.4803	1.5612	1.6405	1.7184	1.7951	1.8708	1.9455	2.0194	2.0925	2.1650
2⅛		.2847	.4088	.5863	.7291	.8477	.9545	1.0682	1.1729	1.2747	1.3689	1.4553	1.5357	1.6163	1.6952	1.7732	1.8495	1.9251	1.9998	2.0735	2.1467
2¼			.2914	.5106	.6605	.7673	.8681	.9737	1.0707	1.1671	1.2585	1.3500	1.4389	1.5252	1.6089	1.6909	1.7712	1.8505	1.9283	2.0053	2.0816	2.1577
2⅜																				
2.750																				
2.875																				
3.000																				
3⅛																				
3.250																				
3⅜																				
3.500																				
Inches.	1¼	1⅜	1½	1⅝	1¾	1⅞	2	2⅛	2¼	2⅜	2½	2⅝	2¾	2⅞	3	3⅛	3¼	3⅜	3½	Inches.



VERTICALS.

rates for passengers and goods, providing, first, that the tariff be made known publicly, and that the railroad company should publish any advance in rates, at least six weeks before it was to take effect. The proviso stipulated that all companies should forward goods at the published tariffs, without distinction of person. Railroads guilty of making preferences were liable to forfeiture. This last provision still applies to all roads in Germany under private ownership.

Rates and fares under this act consist of two items—road tolls and transport charges. The Council of Trade fixed these road tolls according to specific principles, and the railroads were obliged to conform to them. These tolls had to be revised by the council at intervals of not less than three nor more than ten years. The fares were different from the tolls, and were not subject to the regulations of the council. The companies could fix the cost of transport for passengers and goods at their discretion, after the road-toll tariffs had been settled by the council. If the profits from fares and tolls exceeded 10 per cent. of the share capital, the rates had to be reduced to bring the profits down to that figure. German roads usually charge rates to bring about the greatest amount of trade.

By the act of 1838, the Prussian government recognized the possibility of state ownership by attaching certain conditions to the grants of privileges. The act reserved the right to purchase under the following conditions: first, the government was not to demand the yielding up of a road until 30 years had elapsed since its opening. Second, this demand could only be made when a new settlement of a road tolls was necessary. Third, the railroad management must be notified of the intended purchase at least a year before the time appointed for surrendering the road. Fourth, as consideration the government should pay twenty-five times the average dividends for the preceding five years.

In 1842 the policy of subsidies came into vogue. The system was one of state guarantees, or of valuable state concessions. The capital for most of the private lines in Germany has been obtained by means of these. Whenever the state made concessions, it accompanied them with stipulations, with a view to the public good—such as fixing a low tariff or the construction of branch lines or feeders. When compelled to advance money in the form of guarantees, the government frequently stipulated for the right to purchase the line before the time fixed by the general law. It also stipulated for the acquisition of management. The building of branches was sometimes encouraged by the state by purchasing stock, and in some cases by a free grant of a part of the mileage cost. In other cases a privilege would be granted to a new line, provided the district though which the road passed furnished the land, or sufficient funds to buy it free of cost to the company.

"In 1850," says Bismarck in an article on state ownership, "railroads in Prussia were under private control exclusively." Professor Hadley, in his book on Railroad Transportation, says the first state-built and state-managed road was begun in 1848. It extended from Berlin toward the Russian frontier. In 1869 there were three classes of railroads in Germany—viz., government railways, shareholders' railways in government hands, and shareholders' railways. The first class includes all railways built and managed by the state. The funds for building these roads were raised either by loans, taxes, or both. The profits form a part of the general revenues of the country. There are no shares in these roads, and therefore no dividends; but the profits are all turned into the state treasury. A constitutional requirement to publish all fiscal reports compels the government to publish a report of the earnings, etc., of the roads.

The second class consists of roads built by shareholders, but the management of which has been acquired by the government. This was the usual result when roads were forced to borrow money to run the road. On such loans the government guaranteed the payment of the interest to lenders, and in turn required security for the guarantee. The roads were usually turned over to state management as the best means for realizing on the securities. The third class is made up of roads built and controlled by shareholders, but the state may own a large number of shares in them.

Down to 1860 the Prussian government had continued the building of railroads, and kept on purchasing shares in private roads with the proceeds of the railroad tax. In 1861 Bismarck made a change. German industries had to yield to German love of glory and military necessities. The railroad tax that year was diverted to other objects. The wars of 1866 and 1870, and the consolidation of Germany, opened up new lines of traffic and created a demand for more railroads. These demands were mostly met by private enterprise. By the Peace at the end of the Franco-Prussian War, the railroads of Alsace and Lorraine were to become the property of Germany after compensation. These lines came under state control. For a few years after the war railroad building went on very rapidly, both by private companies and by the state, but the crisis of 1873 put an end to it for a while.

In 1873 an Eisenbahnamt—railroad department—was established in Germany. It was composed of seven members, with authority over the provisions of the constitution relating to railroads. This included regulating rates. There was a rule requiring publicity, and one to do away with abuses. In the matter of rates the department was not much of a success. Practically this is under the control of the different states and not in the hands of the general government.

From 1873 on the movement toward state control grew but slowly. It was a cherished scheme of Bismarck's to have a system of state roads. In 1878 there were only about 3,000 miles of state-owned roads in Prussia; 2,000 miles more were managed by the state for private companies, and 600 miles were under private management and ownership. In 1879 two lines connecting Berlin with Cologne were purchased by the state. These purchases were continued until there were 7,000 miles owned by the state in 1881 and a great many lines under state management. By 1884 nearly all private roads had been purchased. The liberal prices offered for the roads were too tempting for the companies to withstand. In some cases the stockholders received 16 per cent. on their investment. Prussian four per cent. bonds were usually given in exchange for the securities of the roads. The amounts given were such as would give the holders of the securities about the same income they would have received had the road remained in private hands. The companies were not obliged to sell. In the year 1883-84 there were 18,625 miles of normal gauge out of a total 22,125 miles of Prussian railroads either owned by the state or administered for its account. There were 400 miles worked by the state for private companies, and 3,240 miles in the hands of private companies. In other words, nine-tenths of the mileage was in the state's hands. In purchasing the roads payment was also made in consols. The states assumed the debts of the companies, the average rate of interest on which was 4½ per cent. These debts are being rapidly extinguished.

We now come to the present method of German roads. They are subject to the laws and regulations of the states of the Empire; though nominally under the control of an Imperial Railway Board. From time to time this board considers all radical changes in the general tariff, and the changes are applicable to the whole Empire. A Minister of Public Works is placed in charge of all the railroads in Prussia, with an Advisory Council to assist him. This council consists of a president, two members nominated by the Minister for Finance, two by the Minister for Public Works, three by the Ministers for Agriculture, Domains and Forests, three by the Ministers for Commerce and Manufacturers, and forty elected by the various provinces and cities of the kingdom. The term of these officers is three years. This council assists the Minister of Public Works to decide all cases involving the application of the tariffs, all matters touching the construction of the roads and the traffic, and all questions relating to the general policy of the road. It also assists in deciding when exceptional and when differential tariffs may be granted. The minister commits the actual direction of the roads to 11 Provincial Railway Boards, the members of which are nominated by himself. He supervises all actions of these boards. Regulation of claims for damages, application of existing tariffs, introduction of new local tariffs, superintendence of the employés, supply of the rolling stock, and all matters touching conveyance are intrusted to them. They in turn are advised on all questions of traffic by a District Council. This council is made up of representatives of the Departments of Commerce, Manufactures, Agriculture and Forestry. They are elected for three years by the Chambers of Agriculture and Commerce. The Provincial Boards must consult the District Councils on the questions of tariff and traffic and must consider proposals in regard to these, which may originate with the council. They are of great service to traders and railway managers in the adjustment of tariffs. They prevent much useless friction.

In 1884 a general tariff was in force for all Germany. Increases and reductions are alike subject to the approval of the government. Every increase must be sanctioned by a law of the Empire. The railroads are regarded as common carriers, and all discriminations against shippers and goods, except explosives, are punishable. No railroad is obliged to carry explosives. All exceptional tariffs must be published in a convenient form. Six weeks' notice must be given of an intended increase in an exceptional tariff.

Germany has a system of fixed terminal charges, varying from 28 to 48 cents per ton. The charges increase within these limits for goods of less than five tons, according to the distance carried. All lots of less than five tons are loaded and unloaded free of charge. The transport charges for larger loads are lower, but the unloading and loading must be done at the shipper's expense. If the railroad loads for a shipper, the charge is 12 cents per ton for loading, and the same for unloading.

The system of rates and classification of freight practiced in Germany prior to 1871 was a very crude one. In 1871 a "natural system" was adopted in Alsace and Lorraine, and in many other German states. The following is the so-called "natural system," as given by Professor Hadley.

	Terminal charges. (cents.)	Mileage rates. (cents.)
Express	55	9.00
Parcels	41	3.60
Box car:		
Half car-load, per ton	33	2.70
Whole " "	22	2.25
Platform car:		
Half car-load, per ton	33	1.80
Whole " "	22	1.35
Coal	33	0.90

The above rates were the rates per ton in each class, and are higher than those of to-day. This classification was not a universal one. In 1877 the "Compromise System" was put in force throughout the Empire. This is also known as the "Reform Tariff" of 1877. Its principle is one of uniform charges. It is as follows:

Class I. Lots less than five tons, $.044 per ton-mile for goods of every description, subject to an increase of 50 per cent. for bulky articles.

Class II. Five-ton loads, $.027 per ton-mile for loads not carried at lower rates under the special tariffs mentioned below.

Class III. Ten-ton loads, $.024 per ton-mile for loads not carried at lower rates under the special tariffs mentioned below.

Class IV. Five-ton loads in special classes given below, $.020 per ton-mile for loads comprised in the three special classes I. (A), II. (B) and III. (C), given below.

Class V. Ten-ton loads in special class I. (A), $.018 per ton-mile.

Class VI. Ten-ton loads in special class II. (B), $.014 per ton mile.

Class VII. Ten-ton loads in special class III. (C), $.010 per ton-mile up to 62¾ miles; $.009 per ton-mile for longer distance than 62¾ miles.

Special class I. (A) includes grain, flour, wool, soda, glass tools, copper articles, lead, pitch-pine, hardware, machinery etc.

Special class II. (B), timber partly prepared, rails, lead ore, steel plates, earthenware, flax, vegetables, such as turnips and cabbages, rags, etc.

Special class III. (C) includes coal, rough timber, various sorts of clay, manures, potatoes and the cheapest vegetables, straw, pig-iron, iron ores, charcoal, etc.

Goods in quantities of less than five tons forwarded by passenger trains are charged double the rate of class I. In quantities of five tons and under ten tons they are charged double the rate of class II.; quantities of ten tons, double the rate of class III. All perishable articles are forwarded by passenger or van trains, and are charged in class I. In classes I. and VII. terminal charges are added to the mileage rate. In 1883 the average rate for transport of minerals and merchandise together was $.017 per ton-mile. The railroad loads and unloads all goods carried under class I. free of charge. Goods in all other classes must be loaded and unloaded at the shipper's expense. Cartage is also undertaken by the railroads at published rates. The special classes I. (A), II. (B), III. (C), subject to classes IV., V., VI. and VII., are usually carried in large quantities, and are rarely of any great relative value. Certain "exceptional tariffs" are also given for minerals in large quantities. The mileage rates on these are very low. There are also rates on contracts for carrying coal, coke, etc., between certain places.

The following table will give a good idea of the rates for carrying coal, etc.:

Distance in English miles from sending station to destination, 485 miles.	Carriage rates per ton for whole distance, $2.59.	Rate per ton per English mile, $.005.

On the whole, the German system of car-load classification is more crude than the one in this country, but it has compensating advantages in its simplicity. There is little complaint about "discriminations" and "exceptional tariffs." The shippers acquiesce in the justness of the policy of making reductions for regular shipments. The authorities are always ready to hear and remedy the complaints of shippers after due investigation. In America our Commission is doing its best to reconcile the shippers and the railroad managers; but in a country like this with its ever-changing facilities and conditions of trade, it is well-nigh impossible. The German authorities have far less to encounter in settling their difficulties, for the system of state ownership does much to lessen them, by doing away in a great measure with competition, the source of all discriminations. M.

TECHNICAL.

Locomotive Building.

The Louisville, New Albany & Chicago has received two additional consolidation locomotives, part of an order recently placed in the East. The company expects four more engines next month.

The Rio Grande Western has now received 12 of its standard gauge locomotives, and these are all in service on the part of the road which has been made standard gauge.

Car Notes.

The Indianapolis Car & Manufacturing Co. is delivering 25 box cars daily to the Lake Shore & Michigan Southern on the order for 500 placed with the company a few weeks ago.

The Kansas City, Fort Scott & Memphis has just placed in service three new passenger cars built at its shops near Kansas City.

The Sioux City & Northern has now in service six locomotives, six passenger and three baggage cars and five cabooses, all new. The company has also in service 100 platform, 100 box and 100 stock cars.

Bridge Notes.

The piers for the addition of the Smithfield street bridge at Pittsburgh have been finished, and work on the superstructure will begin in a few days. The Pencoyd Bridge Works have the contract.

The town council of Cumberland, R. I., is to erect a new iron bridge at that place.

The Vermont Construction Co., of St. Albans, Vt., has the contract for building several bridges at Newburg Centre, Vt.

The city of Knoxville, Tenn., proposes to erect two new bridges in the city, one across West Fifth avenue and the other at McGhee street.

The Atchison, Topeka & Santa Fe is said to have secured control of a company which has a charter from Congress to build a steel bridge over the Missouri River at Atchison, Kan. It is stated that the new bridge will be completed next fall.

The City Engineer of Birmingham, Ala., is preparing plans for a new bridge in that city.

The contract will be let shortly for building an iron bridge across Elm Creek, near Ballinger, Tex.

It is proposed to build a new bridge across Crystal Creek, at Beattyville, Ky.

The Municipal Council of Cheyenne, Wyo., has approved the plan of the Union Pacific for a new viaduct to be built across the tracks of that road on Central avenue. The viaduct will be 1,055 ft. long, and will cost about $55,000. The expense will be borne by the city, which proposes that the bridge remain in the control of

the contractor, the city paying an annual rental of six per cent. on the cost, and to eventually purchase it.

The bridge of the Denver, Leadville & Gunnison, about four miles from Como, Col., was burned last week by fire.

The board of freeholders of Mercer County, N. J., have just completed a new bridge at Chambers street, Trenton, but the Pennsylvania railroad has prevented the opening of the structure, claiming that $13,500 is due it for expenses connected with the building of the bridge.

Work on the Merchants' Bridge at St. Louis is progressing rapidly. The central span has been completed; but one span and 900 ft. of the approaches now remain to be done by the Union Bridge Co., and the company has until June 1 next in which to complete the work. The officers of the Merchants' Bridge Co. expect to have the bridge proper complete by April 1, and the approaches, which are now well under way, complete by May 1

The Western of Alabama has commenced the construction of an iron bridge across Big Swamp Creek, and another across Old Town Creek, near Benton, Ala. The Atlanta Bridge Co., of Atlanta, Ga., has the contracts.

Bills have been introduced in the Senate to authorize the New Orleans, Natchez & Fort Scott to construct two bridges, one across Boeuf River, Louisiana, north of Rayville, Richland parish, and the other over the same river at the eastern line of Caldwell parish, near Winnsboro.

The board of army engineers appointed to investigate the proposed bridges over the Mississippi River at New Orleans have made a report, doubting the necessity of any bridge at present, but favoring the site above the city. The plans for this bridge which were submitted by Mr. E. L. Corthell, President of the Southern Bridge & Railway Co., provided for three spans, two piers being in the river between the low water lines; they provide for shore spans of not less than 800 ft., and not less than 75 ft. high above extreme high water and for a central height of the centre span not less than 82 ft. The board proposes to increase this central height of the central span to 85 ft., and to require that the 800 ft. span be in the clear at low water.

The Boston Bridge Works have been awarded the contract for a three-span double-track iron bridge across the White River, at White River Junction, Vt., on the Passumpsic Division of the Boston & Maine.

Manufacturing and Business.

E. Gould & Eberhardt, of Newark, N. J., have an order for four drill presses and an automatic gear cutter with rack attachment for the Watervliet Arsenal at West Troy, N. Y.

The Westinghouse Air Brake Co., of Pittsburgh, has purchased the large building of the Philadelphia Natural Gas Co., and will move its offices from Allegheny when the works at Wilmerding are completed. The building is located at the corner of Penn avenue and Ninth street, and was purchased for $600,000. It was erected about two years ago.

The Bucyrus Foundry & Manufacturing Co., of Bucyrus, O., has recently contracted to furnish three large land dredges for use in constructing a canal at Bear Lake, Utah. The company has also other heavy contracts for large dredges and orders for three large steam shovels for the Lake Superior iron ore district. These shovels are to be used for handling iron ore from the stock piles during the season of navigation. Altogether the company has orders for 13 steam shovels for spring delivery. This includes five for the Northern Pacific previously referred to. During the present year the Lake Shore & Michigan Southern has bought four large Bucyrus shovels.

The producers made by the Taylor Gas Producer Co., of Philadelphia, have been used by the Lehigh Zinc Co. on a spelter furnace for the past six months with excellent results, and the company is to enlarge its plant and use them on other furnaces. The Bethlehem Iron Co. has eight in use and two more building. One is being erected at Steelton Pa., for the Pennsylvania Steel Co., and a plant of six large producers is nearly ready for shipment to Bolivia, S. A. The company is also erecting producers near Pittsburgh and in Alabama, California and other States.

The Clark Pneumatic Motor Co., with a capital stock of $10,000, has filed a certificate of incorporation in New York for the purpose of manufacturing locomotive engines, rolling stock and machinery for railroad use. Leonidas D. Pressley, John Wood, William M. O'Reagan, Charles F. Fogg, Perry Vanderlip, George Whittaker and Horatio C. King, all of Brooklyn, N. Y.; Joseph J. Walton of Newark, N. J., and George E. Darhent, of Pamrapo, N. J., are the incorporators.

Iron and Steel.

Cartwright, McCurdy & Co., of Youngstown, Ohio, have commenced the erection of a building, 50 × 100, to contain an 8-in. mill. It will be completed about Feb. 1, and will give employment to 25 additional hands.

The Edgar Thomson Steel Works, of Carnegie Bros. & Co., Limited, at Braddock, Pa., have closed down for repairs. Another 10-ton converter will be added to the plant and other additions made. The two blast-furnaces now being erected by the firm are rapidly approaching completion, and it is expected that they will be ready for blast in a few months. The output of rails from these works has for some time past averaged 1,000 tons per day.

Riter & Conley, of Pittsburgh, have purchased the old Superior Rail-Mill property in Allegheny City for $75,000, the firm to take possession on Jan. 1. Employment will be given to some 200 men, and structural iron will be manufactured. The property has a frontage on the Ohio River, and connection with several railroads.

The Gautier steel department of the Cambria Iron Co., at Johnstown, Pa., is now turning out a product of 3,000 tons per week, and this will be increased as new machinery can be added.

The East Chicago Foundry Co., whose works are at East Chicago, Ind., has its new plant in operation, and has taken contracts for castings which will require considerable time to fill. The company has an office in the Rookery Building, Chicago.

D. R. Lean has received a contract to erect two 15-ton open-hearth Lash steel-melting furnaces for the W. Dewees Wood Co., of McKeesport, Pa. Work on their construction has already been commenced. The Morgan Engineering Co., of Alliance, O., has the contract for the machinery, and W. B. Scaife & Sons, of Pittsburgh, will erect the buildings.

Last week the stock of Long & Co., which recently failed, was sold at public auction at the mills at Chartiers, Pa., to satisfy the claims of creditors. About $78,000 was realized at the two sales held.

The Rail Market.

Steel Rails.—About 3,500 tons of steel rails have been sold, chiefly by Western mills, including 15,000 tons to the Missouri, Kansas & Texas, 5,000 tons to the Natchez Construction Co., and 6,000 tons to the Baltimore & Ohio. An interesting transaction recently made is the sale of a lot of about 6,000 tons of 40-lb. rails, to relay, at $33 on the track, in the South, their place being taken by 9,000 tons of 60-lb. rails purchased before the rise at $26. The market continues steady at $35 in the East and in Pittsburgh, and $36.25@$37 in Chicago.

Old Rails.—The market is quiet, but an active business is looked for. Sales are reported in the East at $27 on track. At Chicago prices for old iron rails range from $25.75@$26.50, and for steel rails quotations are $20.25@$21.50. Pittsburgh quotes old iron rails at $28 and old steel rails $23.50@$24.

New Shops.

The Sheffield Machine Co., which is to build the new shops of the Memphis & Charleston, in Sheffield, Ala., has awarded the contract for grading the grounds to J. T. Crass, of Decatur, Ala., and for the buildings to Gallion & Co., of Knoxville, Tenn.

The City Council of Macon, Ga., has granted the Central of Georgia a large tract of ground in the city, adjoining the property on which its car shops are built. The company is to build an extension of the car works on this property, to give them a yearly capacity of 20 passenger and 500 cars.

Rolling Stock in France and Germany.

French railroad statistics show that there are in use on French lines 10,000 locomotives, 4,500 first-class carriages, 10,000 in the second and third classes, 10,000 fast-freight cars and 235,000 ordinary freight cars. In Germany there were in use at the end of 1888, altogether, 12,811 locomotives, 255,972 baggage, freight and mail cars, and 23,793 passenger cars, with seating capacity for 1,016,377 passengers.

Cars on the Rear of Fast Trains.

German railroad officials are giving special attention to complaints regarding excessive oscillations of the rear cars of fast trains. Recent regulations specify that only such cars are to be used on the rear of fast trains as are in first-class condition, so far as axles, wheels, bearings and springs are concerned. The rear cars are to be close-coupled, and careful attention is to be given to braking on heavy down grades. Station hands are to closely examine the cars with respect to good coupling, and, in general, the behavior of the rear cars is to be closely watched, and they are to be at once reported for repairs if in any way deficient.

Westinghouse Brake in Germany.

It is officially announced that with the completion of the year 1890 all passenger trains on the Würtemberg railroad, Germany, will be fitted with Westinghouse air brakes. The necessary appropriation of 724,786 marks has been made.

A Heavy Locomotive for the St. Gothard.

An order for a locomotive of exceptional size was recently placed at the works of J. A. Muffei, at Munich, Germany, by the St. Gothard Railroad Co. The engine will be a compound tender locomotive, designed on the Mallet principle, and will weigh 85 tons when in working condition. There will be six pairs of coupled wheels. Detailed particulars of the engine have not yet been made public.

Link Motion Model.

Messrs. Pedrick & Ayer, of Philadelphia, have put on the market a model showing the valve motion of a standard 17 × 24 eight-wheel locomotive. All the parts are carefully shown to scale, and the model is mounted in such a way as to be conveniently studied. It is sold at a price so moderate as to put it within the reach of locomotive engineers.

Sioux City Elevated Road.

The Sioux City Rapid Transit Co. has closed a contract with the King Iron Bridge & Mfg. Co., of Cleveland, for 1⅛ miles of steel elevated railroad to cost $242,400. Work is to begin at once.

Elevated Railroad Coaling Station.

The Manhattan Elevated is to abandon the coaling station at 145th street and Eighth avenue, New York City, after which engines will take coal at 162d street and Harlem River. For some time past the Cornell Iron Works have been engaged extending the elevated trestle from 159th to 162d street, and the work is nearly completed. Docks and slips have been built on the river, at which canal boats will land to deliver coal. Two elevators will be put in and will hoist coal directly from the boats into pockets on the trestle, where engines will take it from chutes. The work is contracted to be finished by April 1.

Additional Tracks for the Lake Shore.

The following item is going the rounds:

"The Lake Shore is preparing to lay a third track on a considerable portion of the route, and before long a fourth is possible." The best information that we can get as to this is that it is greatly exaggerated.

An Air Brake Patent Decision.

The Commissioner of Patents has rendered a decision, Dec. 21, in the case of Westinghouse, Jr., versus Dixon, in which he sustains Dixon's patent. The invention relates to the automatic air-brake system, and consists of an apparatus by which the engineer, by charging and venting a train pipe at the locomotive, operates a valve controlling the piston at each car to admit compressed air from a separate storage reservoir to the brake cylinder and discharge it therefrom at will, for the purpose of setting and releasing the brakes. The case has been hotly contested in the Patent Office.—*Chicago Interocean.*

The Grant Locomotive Works.

It is announced that the Grant Locomotive Works are to be moved to Chicago. Many rumors have been put in circulation in the last year or so concerning these works, but this one is essentially accurate. It is stated that Mr. E. T. Jeffrey, recently General Manager of the Illinois Central, will be one of the principal officers in the new organization, and that Mr. H. H. Porter and other Chicago men are interested. Work upon the new shops, which are to be in the southwestern part of the city, is to be begun at once, and it is expected that they will be in operation within a year.

The Chicago Ship Building Co.

It is reported that the Globe Iron Works Co., of Cleveland, the most extensive steel shipbuilders on the lakes, have decided to join with the Illinois Steel Co. in the organization of a company to construct steel ships in Chicago. The new corporation will be known as the Chicago Shipbuilding Co, and six big steel steamers will be on the stocks in its yards within a few months. The yard will be located on the east side of the Calumet River in South Chicago. The following are the officers of the company: John F. Pankhurst, President; Luther Allen, Vice-President and Treasurer, and W. I. Babcock, Manager.

THE SCRAP HEAP.

Scrap Notes.

The charge is made that the freight conductors and brakemen of one division of the Missouri Pacific have established a regular business in the transportation of tramps, carrying them from place to place at a very small cash fare. Detectives have been working on the case for some time, and, as a result, there is to be a general discharge.

An Underground Railroad in Buenos Ayres.

Buenos Ayres is to have an underground railroad. It will be lighted electrically, and is to be ready for traffic in three years. The cost of construction is placed at about $6,000,000. After a period of 90 years the road is to become government property.

Russian Wrecking Cars.

A wrecking car, to be used in cases of accident, is shortly to be introduced on the Russian railroads. It consists essentially of a large platform car fitted up with a blacksmith's shed and the necessary tools, lanterns for signaling purposes, implements for earth and carpenter work, and carrying besides a number of rails, ties, fish plates, switches, etc. The cars are to be kept ready for instant departure to any point where they may be required.

The Mekarski Compressed Air System for Street Cars.

In the suburbs of Paris, as well as in Nantes, Bordeaux, Lyons, Limoges, and several other towns the Mekarski compressed air system for street railroad work seems to have found much favor. In Nantes the system has been in use for eight years past, and is claimed to have effected a saving of from 25 to 30 per cent. as compared with horse traction. The compressed air is passed through hot water previous to being used, thus avoiding, among other things, the difficulties experienced from the low temperature incident to the expansion of compressed air in engine cylinders. The driving cylinders are located under the floors of the cars, and the stopping and starting gear, etc., is arranged on the front platform of each car. Only one attendant, not necessarily possessing any mechanical training, is necessary to work the machinery. The cars receive a charge of compressed air at a central station, the quantity of air for each depending upon the amount of traffic to be handled and the distances to be passed over. The rails used are the same as those employed on ordinary horse street car lines. The speed of the cars ranges from about 7½ to 8 miles per hour, and the compressed air charge is, on an average, sufficient to cover a distance of about 10½ miles.

The Staten Island Terminal.

The Stickney scheme for docks, stock yards and warehouses again turns up. This time it is stated that the contract for the wharves will probably be announced within a month. It is said that a large water front between Clifton and Fort Wadsworth has been secured. Nothing authentic, however, can be learned about the project.

The Hartford Station Case.

The decision of the Connecticut Railroad Commissioners in the matter of the Hartford station is considered a victory for the Hartford people. The consolidated road would not make the alterations asked for, and the Commissioners now order the turnstiles removed, the baggage room moved, and signs put up as well as guards against engine drippings overhead.

A Storage Trestle.

James E. McIntyre, of Buffalo, N. Y., has the contract for the construction of a storage coal trestle just outside the eastern limits of Buffalo for the Lehigh Valley. The trestle will have a storage capacity of 150,000 tons, and will cost entire, $350,000. It will require 1,500 yards of masonry, 41,000 yards of excavation in all, 400,000 lbs. of wrought iron, 500,000 of cast iron, and the removal of 40,000 yards of rock for tunnels to be built for the cars on rock bed under the trestles. The trestle will have a storage capacity of 150,000 tons, and will be built on the gravity principle.

Train Wreckers in France.

An attempt was made on Saturday to wreck the Marseilles & Bordeaux express train. Robbery is supposed to have been the motive.

RAILROAD LAW—NOTES OF DECISIONS.

Powers, Liabilities and Regulations of Railroads.

In Alabama the Supreme Court rules that a court of equity will not enjoin a railroad company from proceeding to construct its road on the roadbed of another company, pending an appeal without *supersedeas* from a judgment of the probate court condemning a part of the right of way of the last-named company, but not including its tracks, in the absence of some circumstances showing that an irreparable injury will be inflicted, as the probate court has jurisdiction to condemn so much of the right of way as is not in actual use or necessary to the enjoyment of that part so used, and the invasion of the right of way is a simple trespass, for which the legal remedy is ample.[1]

In Virginia the Supreme Court of Appeals holds that one furnishing rolling stock to a railroad, retaining the title as security, before the appointment of a receiver, after being paid by the latter for the use of the rolling stock since his appointment, and exhausting his lien thereon, is, as to the residue of his debt, only a general creditor of the corporation, with a claim inferior to that of a mortgagee.[2]

In the same case in Virginia a railroad owed wages and other debts of a privileged class, and also overdue coupons secured by mortgages. C. & Co. held a large amount of these coupons, and furnished the corporation money to pay portions of said debts, taking its promissory note therefor. A scheme for funding all this indebtedness was adopted, and bonds secured on the income of the road were issued, of which C. & Co. took enough, at

60 cents on the dollar, to equal the amount of their claim, and also took an additional sum for which they paid cash. These bonds were issued, as the company stated, "to pay and provide for its floating indebtedness," and to secure their prompt negotiation the interest thereon was guaranteed by another railroad. No express agreement was made as to whether the former claims of C. & Co. should be extinguished. C. & Co. also took prior mortgage bonds as collateral security for the payment of their income bonds. The Supreme Court of Appeals decides that the acceptance of the bonds constituted a novation of the debt, and that the debt of C. & Co. was postponed to those of the prior mortgagees, as to the mortgaged property.[3]

In Alabama the Supreme Court holds that the section of the state constitution providing that the general assembly may authorize the granting of the right of way by one person or corporation over the lands of another, just compensation being made therefor, does not permit the condemnation of land in the actual use of one railroad company for the benefit of another, unless it is reasonably essential to the construction of the second road to its proposed terminus by the only practicable route. But by practicability is meant only that the expense is not disproportionate to the probable benefits. And the taking is essential when, the public convenience being equally served, the financial interests of the second company will gain more thereby than the first company would probably be injured.[4]

Carriage of Goods and Injuries to Property.

In South Carolina a person having sued for the loss of a team of horses from falling from a bridge over a railroad, the Supreme Court ruled that there is no law requiring a railroad company to build a bridge of any particular width. It must simply be a safe structure.[5]

In Louisiana the Supreme Court holds that when a railroad company equips the engines with the most effective modern and practical appliances, to prevent the escape of fire, the burden of proof is on the party alleging damage by fire from the escape of sparks; and, to render the company liable, the proof of negligence must be positive, strong, and convincing.[6]

In Indiana it is held by the Supreme Court that the owners of hay land adjoining a railroad are not required to keep the grass burned off of the land on which the hay is stacked, or between the stacks and the right of way.[7]

In Minnesota the plaintiff's horse escaped from his custody without his fault, and entered upon the track of the defendant company at a point where it was not fenced, and was struck by a locomotive and killed. The ground at the place where the horse entered had been purchased by the company with the intent to use it for terminal grounds and side tracks when the business of the company so increased as to render such facilities necessary, but it was not being so used at the time of the accident. The Supreme Court holds that the company is liable, the indefinite intent to use the ground for a public purpose not being sufficient to relieve the company from the duty to fence its track as required by statute.[8]

In Kansas, the Supreme Court decides that a person owning lots abutting on a city street, along which a railroad company has constructed and is operating its line by authority of the city council, to recover damages, there must be such a practical obstruction of the street in front of the lots that the owner is denied ingress and egress to and from them.[9]

Injuries to Passengers, Employes and Strangers.

In Mississippi, a female passenger sued for damages for being carried past a station. She testified that she did not know the station, that she was sick, and that she so informed the conductor, who promised to let her know when the station was reached; that he did not do so; and that she did not hear the station called. Her attorney testified that he was on the same train, and got off at the station in question, and that he did not hear the station called, but he admitted that he was familiar with its locality, and did not listen particularly to hear it called. The porter whose duty it was to call the station testified that he did so on the occasion in question, and that he was sure, because his attention was called to the matter the next day. The conductor denied that plaintiff had any such conversation with him as stated. Plaintiff was a morphine eater, and subject to fits of unconsciousness. The U. S. Court holds the railroad not liable.

In New York, the plaintiff was a passenger on a train on the elevated railroad. The train was filled with laboring men going to their work, and was compelled to stop a few feet from the station. There was a platform 30 inches wide running to the station, which platform defendant had provided for its employés. The conductor called out to all passengers who feared being late to their work to get out and walk to the station. More than 50 men started to walk on the platform, or on the track ahead of the train, which, without warning, started on. Those who were on the track, or on the platform so near the track as to be in danger, pressed towards the outer edge of the platform. A panic ensued, and 11 men, including plaintiff, fell to the pavement, and were killed or injured. Plaintiff, who was on the platform a little ahead of the locomotive, while he remembered the starting of the train, and the panic, did not recollect being struck by any one; but it was impossible for the number of men to have pressed back without affecting him. There was no reason why the passengers should not have reached the station safely but for the starting of the train and the panic. The Supreme Court holds the railroad liable.[11]

In Alabama the Supreme Court rules that a statute requiring a whistle to be blown or a bell rung before reaching a crossing has no application to a brakeman who is injured by being struck by a highway bridge while he is standing on the roof of a car.[12]

In New York the Supreme Court holds that a railroad is not liable for an injury to a brakeman by a defect in a brake, when the defect was not known and could not have been discovered before the accident occurred.[13] But in Texas the Federal Court holds that while a brakeman cannot recover for injuries caused by defective brakes if he had or, by the exercise of reasonable prudence, might have had, knowledge of such defects, he is not bound to look for latent or hidden defects.[14]

The Federal Court rules that if a conductor utterly fails to take any precaution to prevent injury to his principal's employé, whom he knows to be in a dangerous position, the fact that the employé carelessly placed himself in that position is no defense under the doctrine of contributory negligence, as such recklessness may amount to a willful act.[15]

In a case in the Federal Court the plaintiff, an employé, was riding on a gravel car. The trainmen in switching allowed ten loaded cars to go down a grade under the management of but one brakeman, who was entirely unable to restrain the velocity of the cars, owing to the steepness of the grade and the weight of the cars. The conductor knew, or might easily have known, that plaintiff was on one of the other cars to which the 10 were to be attached, and that the position was dangerous. The cars struck those already on the track with such force as to throw plaintiff off and injure him. No timely warning was given to plaintiff that the cars were beyond the brakeman's control. The court holds that the conductor was negligent in failing to take such method of switching as would be reasonably safe, or in failing to have a sufficient number of brakemen to manage the cars.[16]

In Virginia a brakeman was ordered by the conductor of a freight train to go up on a freight car while the train was standing to let off a brake. The upper round of the ladder was broken, which was unknown to plaintiff, and while he was leaning out, attempting to get on the roof, the conductor signaled the engineer to back up, and, the dead-block being broken, the cars came together, and plaintiff was caught between them and crushed. The Supreme Court of Appeals decides that the conductor was negligent in starting the engine, knowing the position of plaintiff, and that the railroad is liable.[17]

In Texas a section hand was, with other section hands, riding on a hand-car, when they saw a train approaching. The section boss promptly ordered the gang to lift the car off the track, but while they were so engaged the boss, seeing that there would not be time to get it off, cried out: "Stand clear, and let her go." All the others obeyed and received no injuries, but plaintiff continued his efforts to get the car off; the result being that he was struck by the train. He testified that he was very much excited, and did not hear the order. The Supreme Court sets aside a verdict in his favor, and holds that the railroad is not liable.[18]

In Mississippi the Federal Court lays down the rule of duty of persons at railroad crossings, thus: It is the duty of a person approaching a railroad crossing to stop and look in both directions for approaching trains, and also to listen for the same purpose, particularly when he has reason to believe a train is likely soon to pass, and if he fails to perform this duty, or sees the approaching train and does not wait for it to pass, he assumes the risk of accident and cannot recover, unless defendant's employés, seeing him on the track, neglected to use the means reasonably within their power to prevent the accident.[19]

In Illinois the Supreme Court rules that failure to "look and listen" before crossing a track is not as a matter of law contributory negligence *per se*.[20]

But in the same case the same court holds that the failure of a railroad engineer to ring the bell and blow the whistle on approaching a crossing, as required by statute, is negligence *per se*.[21]

1 M. & G. R. Co. v. A. M. R. Co., 6 South. Rep., 407.
2 Fidelity & Trust Co. v. S. V. R. Co., 9 S. E. Rep., 759.
3 Fidelity & Trust Co. v. S. V. R. Co., 9 S. E. Rep., 759.
4 M. & G. R. Co. v. A. M. R. Co., 6 South. Rep., 407.
5 Rembert v. I. C. R. Co., 9 S. E. Rep., 968.
6 Meyer v. V. S. & P. R. Co., 6 South. Rep., 218.
7 L., N. A. & C. R. Co. v. Hart, 21 N. E. Rep., 753.
8 Cox v. M., S. S. M. & A. R. Co., 42 N. W. Rep., 921.
9 K., N. & D. R. Co. v. Cuykendall, 21 Pac. Rep., 1,051.
10 Tillery v. Bond, 38 Fed. Rep., 825.
11 Weiler vs. Manhattan R. Co., 6 N. Y. Supp., 320; McCabe vs. Same, Id., p. 418.
12 L. & N. R. Co. v. Hall, 6 South. Rep., 277.
13 Hotis v. N. Y. C. & H. R. R. Co., 6 N. Y. Supp., 605.
14 Carpenter v. Mexican Nat. R. Co., 39 Fed. Rep., 315.
15 Shumacher v. St. L. & S. F. R. Co., 39 Fed. Rep., 174.
16 Shumacher v. St. L. & S. F. R. Co., 39 Fed. Rep., 174.
17 R. & D. R. Co. v. Williams, 9 S. E. Rep., 990.
18 Int. & G. N. R. Co. v. Hester, 11 S. W. Rep., 1,041.
19 Dunning v. Bond, 37 Fed. Rep., 318.
20 T., H. & I. R. Co. v. Vaelker, 22 N. E. Rep., 20.
21 T., H. & I. R. Co. v. Vaelker, 22 N. E. Rep., 20.

General Railroad News.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Canada Southern, semi-annual, 1¼ per cent. and special 1 per cent., payable Feb. 1.

Chicago, Rock Island & Pacific, quarterly, $1 per share, payable Feb. 1.

Lake Shore & Michigan Southern, semi-annual, 2 per cent. and special 1 per cent., payable Feb. 1.

Michigan Central, semi-annual, 2 per cent. and special 1 per cent., payable Feb. 1.

Missouri Pacific, quarterly, 1 per cent., payable Jan. 15.

New York Central & Hudson River, quarterly, 1 per cent. and special ½ per cent., payable Jan. 15.

Northern Pacific, 1 per cent. on the preferred stock, payable Jan. 15.

Norwich & Worcester, semi-annual, 4 per cent., payable Jan. 6.

Richmond & West Point Terminal, semi-annal, 2½ per cent., payable Jan. 2.

Chicago, St Paul, Minneapolis & Omaha, 2 per cent. on the preferred stock, payable Jan. 20.

St. Paul & Duluth, 2½ per cent. on the preferred stock, payable Jan. 16.

Tennessee Coal, Iron & Railroad Co., 8 per cent. on the preferred stock, payable Jan. 9.

Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Boston & Lowell, annual, Boston, Mass., Jan. 1.

Chesapeake & Ohio, special, Pace House, Richmond, Va., Jan. 20.

Cleveland & Pittsburgh, annual, Cleveland, O., Jan. 1.

Colorado Midland, special, Colorado Springs, Colo., Dec. 31, to act upon a proposed lease of the Rio Grande Junction.

Columbus, Hocking Valley & Toledo, annual, Columbus, O., Jan. 14.

Croton Valley, special, 48 Wall street, New York City, Jan. 14.

Denver & Rio Grande, special, Denver, Colo., Dec. 31, to act upon a proposed lease of the Rio Grande Junction.

Indianapolis, Decatur & Western, special, Indianapolis, Ind., Jan. 30.

Louisiana North & South, annual, Gibsland, La., Jan. 15.

McKeesport & Bellevernon, annual, 111 Fourth avenue, Pittsburgh, Pa., Jan. 13.

New York, Ontario & Western, annual, 16 Exchange Place, New York City, Jan. 15.

McKeesport & Bessemer, annual, 111 Fourth avenue, Pittsburgh, Pa., Jan. 13.

Rome, Watertown & Ogdensburg, annual, 96 Broadway, New York City, Dec. 28.

Utah Midland, annual, Walker House, Salt Lake City, Utah Ter., Jan. 6.

Western New York & Pennsylvania, annual, 242 South Third street, Philadelphia, Pa., Jar.. 13.

Railroad and Technical Conventions.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *American Society of Civil Engineers* will hold its next annual meeting at the rooms of the Society, 127 East Twenty-third street, New York City, Jan. 15, at 10 o'clock.

The *New England Railroad Club* meets at its rooms in the United States Hotel, Beach street, Boston, on the second Wednesday of each month, except June, July and August.

The *Western Railway Club* holds regular meetings on the third Tuesday in each month, except June, July and August, at its rooms in the Phenix Building, Jackson street, Chicago, at 2 p. m.

The *New York Railroad Club* meets at its rooms, 113 Liberty street, New York City, at 7:30 p. m., on the third Thursday in each month.

The *Central Railway Club* meets at the Tift House, Buffalo, the fourth Wednesday of January, March, May, August and October.

The *Northwest Railroad Club* meets on the first Saturday of each month in the St. Paul Union Station at 7:30 p. m.

The *American Society of Civil Engineers* holds its regular meeting on the first and third Wednesday in each month, at the House of the Society, 127 East Twenty-third street, New York.

The *Boston Society of Civil Engineers* holds its regular meetings at Boston, at 7:30 p. m., on the third Wednesday in each month. The next meeting will be held at the American House.

The *Western Society of Engineers* holds its regular meetings at its hall, No. 67 Washington street, Chicago, at 7:30 p. m., on the first Tuesday in each month.

The *Engineers' Club of St. Louis* holds regular meetings in St. Louis on the first and third Wednesdays in each month.

The *Engineers' Club of Philadelphia* holds regular meetings at the house of the Club, 1,122 Girard street, Philadelphia.

The *Engineers' Society of Western Pennsylvania* holds regular meetings on the third Tuesday in each month, at 7:30 p. m., at its rooms in the Penn Building, Pittsburgh, Pa.

The *Engineers' Club of Cincinnati* holds its regular meetings at 8 p. m. on the third Thursday of each month at the Club rooms, No. 24 West Fourth street, Cincinnati.

The *Civil Engineers' Club of Cleveland* holds regular meetings on the second Tuesday of each month, at 8:00 p. m., in the Case Library Building, Cleveland. Semi-monthly meetings are held on the Fourth Tuesday of the month.

The *Engineers' Club of Kansas City* meets at Kansas City, Mo., on the first Monday in each month.

The *Civil Engineers' Society of St. Paul* meets at St. Paul, Minn., on the first Monday in each month.

The *Montana Society of Civil Engineers* meets at Helena, Mont., at 7:30 p. m., on the third Saturday in each month.

The *Civil Engineers' Club of Kansas* holds regular meetings on the first Wednesday in each month at Wichita, Kan.

Civil Engineers' Club of Cleveland.

A regular meeting was held Dec. 10, President W. R. Warner in the chair. The following members were elected: Herman Poole, W. B. Cleveland, Royal Gurley and Hiram A. Tucker. Prof. C. F. Maberry, of the Case school, gave a lecture on the Development of the Color Industry from Coal Tar Products.

Engineers' Club of St. Louis.

At the meeting of Dec. 18 the following officers were elected: F. E. Nipher, President; George Burnet, Vice-President; William H. Bryan, Secretary; Charles W. Melcher, Treasurer; J. B. Johnson, Librarian and Manager; J. A. Seddon, Manager; E. D. Meier and S. Bent Russell, directors. Prof. W. B. Potter being absent, the reading of his paper on "Fuel Gas" was postponed. Col. E. D. Meier, the retiring President, read an address, which will be printed in full in the *Journal*. A report was received from the Committee on National Public Works. A communication was read from the Liederkranz Club suggesting the propriety of co-operation on the part of the engineers in raising funds for a monument to Capt. Jas. B. Eads. Col. E. D. Meier, Prof. E. A. Engler and Robert Moore were constituted a committee to attend to the matter.

Montana Society of Civil Engineers.

Meetings were held Nov. 16 and 23. Mr. Charles F. Pearis was elected a member. Colonel de Lacy, Chairman of the Committee on Public Land Surveys, submitted a report recommending that the society address a letter to the Hon. C. H. Carter, member of Congress, calling his attention to the operation and defects of the present system of making surveys, and requesting him to use his influence at Washington in securing a modification of the present law, and, if possible, a repeal of the contract system. The report was adopted.

Rules of Interchange.

The Central Railway Club are discussing the Code of Rules for the interchange of cars. Their recommendations are to be formulated and presented to the Revision Committee of the M. C. B. Association previous to the next annual meeting. At the last meeting of the club Rules 1, 2 and 3 were dealt with. A committee, consisting of Messrs. McIlwain, Macbeth, Lentz, Smith and Schrimpton were appointed to report on Rules 4 to 9, inclusive, to be discussed at the January meeting. To better enable this committee to make an intelligent report they particularly desire that railroad men interested in the interchange of cars will give them their views relating to the rules mentioned. Any communications thereon addressed to the Chairman of the committee will be appreciated.

J. D. McILWAIN,
Grand Trunk Ry., London, Ont.

PERSONAL.

—Mr. D. M. Philbin has been appointed Superintendent of the Duluth, South Shore & Atlantic.

—Mr. James Geddes, Superintendent of the Nashville Division of the Louisville & Nashville, has resigned.

—Mr. H. D. Milton, Division Superintendent of the St. Louis, Arkansas & Texas, at Tyler, Tex., has resigned.

—Mr. John S. Nisbet, Auditor of the Georgia Southern and Florida & Southern, died suddenly in Macon, Ga., ast week.

—Mr. L. D. Richardson, of Chicago, has been appointed Superintendent of the Hot Springs road, to succeed Mr. J. N. Conger, resigned.

—Mr. J. T. Hill has been elected Manager of Coal Mines of the Sloss Coal & Iron Co., of Birmingham, Ala., with headquarters at Coalburg, Ala.

—Mr. Z. T. Ferguson, Master Mechanic of the Mobile & Ohio Railroad shops at Jackson, Tenn., has tendered his resignation, to take effect Jan. 1.

—Mr. Lewis S. Smith, Paymaster of the Texas & Pacific, has been appointed Local Treasurer, to succeed Mr. Guy Sumpter, who has resigned to accept other employment.

—Mr. J. B. Gardiner, for many years Superintendent of the Providence division of the New York, Providence & Boston, has been made Superintendent of the entire road.

—It is reported that David E. Thompson, Superintendent of the Nebraska division of the Burlington & Missouri River road, will tender his resignation on account of ill-health.

—Mr. R. E. Briggs, late Chief Engineer of the Denver & Rio Grande, has accepted a position in the engineering department of the Union Pacific, on the extension from Frisco, Utah, south.

—Mr. Charles W. Bradshaw, who has been for many years the Principal Assistant Engineer of the Louisville & Nashville, has been appointed Roadmaster of the Memphis Division.

—Mr. I. H. Wilson, General Superintendent, and Mr. J. M. Cummings, Trainmaster, of the Ohio, Indiana & Western, were instantly killed last week in a train accident on the road.

—Mr. Charles R. Hudson has been appointed Assistant General Freight Agent of the Atchison, Topeka & Santa Fe, to succeed Mr. O. H. Brown, appointed Freight Claim Agent at Kansas City.

—Mr. William Hunter, who has been connected with the civil engineering department of the Philadelphia & Reading since 1872, has been appointed Chief Assistant Engineer of the road.

—Mr. J. F. O'Rourke, who was Chief Engineer for the Union Bridge Co., in charge of the construction of the Poughkeepsie Bridge, is to be married, Jan. 7, to Miss Innis, of Poughkeepsie.

—Mr. W. N. Marshall, Master of Trains of the Kansas City, Memphis & Birmingham, has been appointed Superintendent of the Savannah, Americus & Montgomery, to succeed Capt. R. E. Hardaway.

—Mr. F. L. Linds has been appointed General Passenger and Ticket Agent of the St. Joseph & Grand Island and leased lines, relieving Mr. W. P. Robinson, Jr., of that part of his duties. Mr. Robinson continues as General Freight Agent of the road.

—Mr. H. C. Kettendorf, Master Car Builder and Master Mechanic of the New Haven & Derby, died in New Haven, Conn., last week after a long illness. He was 52 years old, and was formerly connected with the New York, New Haven & Hartford.

—Mr. J. N. Metheany, Superintendent of the Northern Division of the Grand Rapids & Indiana, died at his home in Grand Rapids, Mich., Dec. 20. He had been Superintendent of the Northern division of this road for the last 13 years, and was previously Superintendent of the Southern division between 1872 and 1876.

—Mr. E. J Blake has been appointed Chief Engineer of the Chicago, Burlington & Quincy, to succeed George C. Smith, resigned to become Chief Engineer of construction of the Western Railroad of Uraguay. Mr. Blake has been Chief Engineer of the Hannibal & St. Joseph road and the Kansas City, St. Joseph & Council Bluffs road.

—Mr. W. M. Greene, now Assistant to the President of the Cleveland, Cincinnati, Chicago & St. Louis, has been appointed General Manager of the system, to take effect Jan. 1, 1890. Mr. Greene was General Manager of the Cincinnati, Indianapolis & Chicago before the consolidation, and has been Assistant to the President since the consolidation.

—Mr. Edgar Van Etten, who, as stated last week, has been appointed Manager of the newly organized Buffalo Car Service Association, has been Division Superintendent of the Western Division of the Rome, Watertown & Ogdensburg since last September, and was formerly Superintendent of the Buffalo Division of the New York, Lake Erie & Western.

—Mr. Robert B. Pegram, Jr., Superintendent of the Memphis & Charleston division of the East Tennessee, Virginia & Georgia, since Sept. 1, 1881, has resigned. Before accepting this position, Mr. Pegram was for a short time with the International & Great Northern as Superintendent, but was previously Master of Transportation on the Memphis & Charleston between 1877 and 1881.

—Mr. W. C. Stith, Assistant General Freight Agent of the Missouri Pacific, has been appointed General Freight Agent of the Kansas City, Fort Scott & Gulf road, to succeed Mr. H. A. Johnson, resigned to go to the Union Pacific. Mr. Stith has held this position on the Missouri Pacific since Sept. 6, 1886, and has been succeeded by Mr. George Maclain, Secretary of the Southern Interstate Association.

—Mr. J. M. Williams, General Freight Agent of the New York, Providence & Boston, at the earnest solicitation of the company, and with consent of the General Manager of the New York & New England road, withdrew his resignation and will remain with the New York, Providence & Boston as General Freight Agent, and not accept the similar position offered him on the New York & New England.

—Official announcement has been made of the following appointments: Mr. C. F. Resseguie to succeed Mr. G. M. Cumming as General Manager of the Mountain Division; Mr. Joseph M. Barr, Superintendent of the Cheyenne Division, to succeed Mr. C. F. Ressiguie as Superintendent of the Nebraska Division, and Mr. B. M. Ryder and Mr. R. M. Baxter, Superintendent and Assistant Superintendent, respectively, of the Wyoming Division.

—Mr. Paul Morton, General Freight Agent of the Chicago, Burlington & Quincy, has resigned his position, and will leave the service of the company Feb. 1. Mr. Morton's successor as General Freight Agent of the road will be, it is stated, Mr. Thomas Miller, at present General Freight Agent of the Burlington & Missouri at Omaha. Mr. Morton is very widely known, more particularly from his services during the strike of locomotive engineers on the Chicago, Burlington & Quincy two years ago, during which he had charge of the defense of the property of the company. Soon after the strike was ended he was promoted from General Passenger Agent to General Freight Agent.

ELECTIONS AND APPOINTMENTS.

Atchison, Topeka & Santa Fe.—O. H. Brown has been appointed Freight Claim Agent, and Charles R. Hudson has been appointed Assistant General Freight Agent, both with headquarters at Topeka, Kan.

Central of Georgia.—J. C. McKenzie has been appointed Superintendent of the Southwestern division, vice W. H. Starr, resigned, to accept the position of Superintendent of Transportation.

Concord & Montreal.—At a meeting of the Directors of the road in Concord, N. H., this week, the following officers were elected: H. E. Chamberlain, General Traffic Manager; E. F. Mann, Superintendent of Train Service; W. A. Stowell, Superintendent of Construction and Maintenance of Way; F. E. Brown, General Passenger and Ticket Agent; G. W. Storer, New England Passenger Agent; J. T. Gordon, Superintendent of Motive Power and Rolling Stock; J. F. Webster, Treasurer; Samuel Barrett, General Freight Agent; W. H. Alexander, Supply Agent.

Cumberland Mountain & Tennessee River.—The directors of this company are: A. Deresethal, of New York; P. W. Keith and Jessie Brown, of Scottsboro, Ala.; S. L. McBride, of Atlanta; J. C. Wall, of Wallview, and J. W. Hudson, of Bridgeport.

Denver Resort Railway & Telegraph Co.—This company has been incorporated by Biddle Reeves, A. C. Fisk, R. W. Woodbury, Henri R. Foster, and E. F. Hallack.

Durango, Rico & Southern.—B. N. Freeman, J. E. Schutt, Melvin Edwards, George J. Stafford and T. F. Barbour, of Durango, Col., and E. H. Hackett, of Rico, are the incorporators of this company.

Hutchinson & Southern.—H. A. Christy has been elected President of this road. Charles Collins has been elected General Manager, and E. G. Dick Auditor. The general offices are at Hutchinson, Kan.

Kansas City, Bentonville & Southern.—The directors of this company are: A. W. Dinsmore, T. B. Gilmore, James A. Rice, C. M. Robinson and L. H. McGill.

Louisville, Evansville & St. Louis.—C. B. Cooke has been appointed Auditor of the road, at Louisville, Ky., vice J. J. Collier, resigned.

Lower Laurentian.—The names and addresses of the new board of directors elected last week are as follows: George R. Howell and W. A. Williams, New York City; James McHaught, St. Paul, Minn.; Wm. Cook and Jules Tessiee, Quebec; Robert Kiernan and Henry Hart, Three Rivers, Que. C. A. Scott, 105 Mountain Hill, Quebec, is contractor.

Louisville & Nashville.—Charles W. Bradshaw, Assistant Engineer, has been appointed Roadmaster of the Memphis division, with headquarters at Bowling Green, Ky.

Missouri.—John A. Scudder, Charles Parsons and Daniel Catlin, directors of this company. P. C. Maffitt is President and W. D. Henry is Secretary. The office is at 1,828 Market street, St. Louis, Mo.

New York, New Haven & Hartford.—The directors of the company have re-elected Charles P. Clark President; E. M. Reed, Vice-President; W. D. Bishop, Secretary, and W. L. Squire, treasurer.

Omaha & South Dakota.—The directors of this Dakota company are: R. M. Springer, Forest City, S. D.; Henry Hoffman, Blunt, S. D.; C. H. Dillon, Mitchell; G. H. Hand, Yankton, and G. P. Harben, Olivet.

Pacific.—The following are the directors of this company referred to last week: Samuel Haslett, A. Gerberding, H. Craig, F. T. Newberry, G. W. Phelps, E. A. Husing, J. McCombe, J. D. Sullivan, R. K. Gardiner, J. J. Searle, and R. H. Swayne, and C. A. Chisholm, of Denver, Col.

St. Louis, Arkansas & Texas.—The Arkansas and Missouri division has been divided as follows: That part north of Jonesboro yard, and including the Bird's Point and Delta sections, will be known as the Missouri division; that portion south of the Jonesboro, Little Rock, Pine Bluff and Shreveport sections will be known as the Arkansas division. John W. Fox has been appointed Division Superintendent of the Missouri division, with headquarters at Jonesboro; T. W. Kennan has been appointed Division Superintendent of the Arkansas division, with headquarters at Pine Bluff, Ark. H. D. Milton having resigned, J. A. Edison has has been appointed Divis on Superintendent of the Texas division, with headquarters at Tyler, Tex.

St. Louis Terminal Railroad Association.—At a meeting of the company this week, M. E. Ingalls was elected a director, vice A. W. Clef resigned. J. F. Barnard, President of the Ohio & Mississippi, was elected Vice-President.

Salem, Astoria & Eastern.—The incorporators of this Oregon company are: H W. Cettle, E. M. Waite, Squire Farrar, William England and Dr. H. J. Minthorn, of Salem, Ore.

Schuylkill East Side —Directors of this division of the Baltimore & Ohio system have been elected as follows; George de B. Keim, Thomas M. King, vice John K. Cowen, J. B. Washington, H. T. Douglas, J. Van Smith, J. Carroll, Walsh, R. L. Ashurst. Mr. T. M. King was elected President.

St. Louis & Belleville.—The incorporators and first board of directors of this company are: D. P. Alexander, Wichita, Kan; George Knobeloch, C. T. Alexander and Fred Holdner, Belleville, Ill., and John D. Alexander, Wichita, Kan.

Sioux City & Northern.—The following are the officers of this company: T. P. Gere, President; C. L. Wright, Vice-President; F. C. Hills, Secretary and Treasurer and General Manager; James V. Mahoney, Traffic Manager; C. L. Wright, General Solicitor; J. G. Butterfield, Master Mechanic; A. K. Shurtleff, Chief Engineer, and F. A. Seaman, General Claim Agent. The general offices are in Sioux City, Ia.

Stuttgart & Arkansas River.—The stockholders of the road, at a recent meeting, elected W. S. Bradford, of Providence, R. I.; T. M. Gillett, of New York City; T. H. Leslie, Wm. Price and A. D. Heirm, directors. T. M. Gillett was elected President and W. S. Bradford, Vice-President.

Terre Haute & Peoria.—W. T. Lyle has been appointed Master of Transportation of the road, with headquarters at Decatur, Ill.

Ticonderoga.—The following are the directors of this New York company: Clayton H. De Lano, G. B. Harford, M. D. Jeffers, Frank L. Brust, D. C. Bascom, M. R. Hack, Jonas Loeb, M. C. Drake, Lyman Maicolm, C. A. Stevens, Orlando Rowell and A. H. Weed, of Ticonderoga, N. Y., and Thomas S. Coolidge, of Glen Falls, N. Y.

Walhouding.—The incorporators of this company, referred to last week, are: Gen. A. J. Warner, Julius C. Pomerne, Wm. R. Pomerne, Henry C. Herbig and John C. Fisher.

OLD AND NEW ROADS.

Alabama Midland.—The grading between Ada and Troy, Ala., was finished last week. This completes all the grading on this road, and the forces which have been employed on it have been transferred to the Montgomery, Tuscaloosa & Birmingham, its northern extension. The tracklaying is now in progress, and will be completed in a short time.

Arkansas & Gulf.—This company has filed articles of incorporation in Arkansas, with a capital stock of $78,000. The company proposes to build a road from a point in Chicot County, on the Louisiana line, to Arkansas City, through Chicot and Desha counties.

Baltimore & Ohio Southwestern.—This is the new name for the Cincinnati, Washington & Baltimore as reorganized. The formal incorporation and reorganization of the company took place last week. A majority of the stock is held by the Baltimore & Ohio, and the Baltimore & Ohio Southwestern will be more a portion of the Baltimore & Ohio system than that road has been in the past.

Camden County.—Grading is reported in progress on this road between Mt. Ephriam and Spring Mills, N. J., eight miles. The road is being graded by the farmers along the route, those not preferring to grade any part of the road agreeing to subscribe to the capital stock of the company.

Charleston, Sumter & Northern.—A bill is before the state legislature of South Carolina to amend the charter of the Eutawville road and to change the name to the Charleston, Sumter & Northern.

Chicago, Kansas & Arkansas.—This project has recently been revived and the officers state that construction will begin next March. The road is projected from St. Joseph south to Joplin, Mo., and toward Fort Smith, Ark. The Carroll Construction Co., of Canada, has the contract for building part of the line. Joseph Hausen is President. John Donophan, of St. Joseph, is a director.

Chicago, Peoria & St. Louis.—Tracklaying is tobegin shortly at Litchfield, and will be continued until Edwardsville is reached. R. M. Collins is the contractor. L. M. Olmstead is Chief Engineer.

Columbus Southern.—A regular train service has been established between Columbus and Richland, Ga., 39 miles. At Richland connection is made with the Savannah, Americus & Montgomery. The entire line to Albany, 48 miles further, will be opened for traffic in March.

Covington & New River.—John B. Floyd, G. O. Chilton, M. H. Dyer and others have incorporated this company in West Virginia.

Crookston, Fort Stevenson & Montana.—The company has filed articles of incorporation in Minnesota. It proposes to build a line from Duluth through Crookston to the Red River of the North and thence westward. The headquarters of the company are at Crookston.

Cumberland Mountain & Tennessee River.—The survey has been begun for this road, which is to extend from a point on the Tennessee River opposite Kimball to Lancing, Tenn., where it will intersect the Cincinnati Southern. It will run up Battle Creek to Tracy City, thence north from near South Pittsburgh to Lancing, and will about 100 miles long. It will reach valuable coal fields. P. W. Keith, of Scottsboro, Ala., is a director.

Dallas, Pacific & Southeastern.—Arrangements have been completed for beginning tracklaying at once on the 70 miles of this road already graded from Dallas, Tex., northwest. Grading is still in progress. The work on the section just completed has not been heavy. The maximum grade is 1.2 per cent. and the maximum curves three degrees. The earth excavation amounts to about 20,000 yards per mile. There is little rock work. W. J. Sherman, of Dallas, is Chief Engineer.

Denver Resort Railway & Telegraph Co.—This company has been chartered in Colorado to build a road to commence at Denver and extend in a westerly direction to what is known as Lookout Mountain, 16 miles. The capital of the company is $500,000. The office is at Room 9, Jacobson building, Denver.

Durango, Rico & Northern.—This company has been organized at Durango, Col., in the same interest as the Rio Grande Southern. The charter refers to the same route as that of the Rio Grande Southern. This road commences at Durango, thence in a northerly direction up the Animas Valley on the right bank of the Animas River, and through Waterfall Park, Hermosa Creek and along the eastern slope of the La Plata Mountains to the divide separating Hermosa Creek from the Dolores River, thence northerly to Rico. The distance is 43 miles. The surveys have been made and show a maximum grade of 2.69 per cent.

East Shore Terminal.—This company has been incorporated to build a short road at Charleston, S. C., by F. S. Rogers, William E. Huger, S. J. Pregnall and others. The capital stock is $10,000.

Great Northwest Central.—Three hundred men are working on the second 50 miles of this line. The tracklaying on the first 50 miles from Brandon, Man., has been finished. A. Charlebois, of Montreal, has the contract for all the grading and tracklaying that has been let thus far. The construction work is through a prairie, and is very light. Some of the rolling stock has been ordered, and four engines are being used in the work. The road is projected to Battleford, 450 miles from Brandon. J. H. E. Secretary, of Brandon, is Chief Engineer.

Grafton & Upton.—Newell & Snowling, of Uxbridge, Mass., the contractors on the extension from West Upton, east to Milford, Mass., eight miles, have the grading all completed. The tracklaying has reached Hopedale.

Hutchinson & Southern.—This line is now in operation from Hutchinson south to Kingman, Kan., 32 miles. The names of stations and distances in miles from Hutchinson are as follows: South Hutchinson, 2; Fernie, 5; Booth, 8; Castleton, 14; Pretty Prairie, 20; Lashmet, 26, and Kingman, 32. About 60 men are now being employed on the extension of the line from Kingman south for a distance of 30 miles. The extension is to be continued south to Harper and Anthony to the state line. The grade is one per cent. John S. Wolf & Co., of Kingman, have the contract for extending the line. The company will soon give out orders for its rolling stock. The Metropolitan Trust Co., of New York City, is trustee of the mortgage. Charles Collins, of Hutchinson, is General Manager.

Indiana & Lake Michigan.—This road has just been completed between St. Joseph, Mich., and South Bend, Ind., a distance of 40 miles. The line connects at St. Joseph with the Chicago & West Michigan and at South Bend with the Vandalia line, by which it will probably be operated.

Iron Belt.—Organized at Morristown, Tenn., to build a road between Morristown, Hamblen County, Tenn., and Cumberland Gap, in Claiborne County, Tenn., or to a connection with some road extending to Cumberland Gap.

Kentucky Midland.—Tracklaying east from Georgetown, on the Cincinnati Southern, has reached Paris, on the Kentucky Central, 17 miles from Georgetown. The line passes through Newton and Centerville. The road has been in operation from Frankfort to Georgetown, 23 miles, for some time, and through trains from Frankfort to Paris will probably be soon put on.

Knoxville Southern.—Tracklaying has been completed from Blue Ridge, Ga., where connection is made with the Marietta & North Georgia, north to Negro Creek, 25 miles. Tracklaying will soon be commenced at the northern end from Knoxville. Fifty miles of the grading between Knoxville and Negro Creek has been finished, leaving 45 miles yet to be completed to finish the line. It is expected to have this all done by April 1. The contractors still at work on the line are: R. Jones, T. P. Condon, Thomas McFarland and Charles Livingston, all of Knoxville. C. R. Walton is Chief Engineer.

Lackawanna & Montrose.—It is stated that the Delaware, Lackawanna & Western has agreed to lay the track on this road and operate it, if the company secures the right of way and does the grading between Montrose and the connection with the Delaware, Lackawanna & Western, at Montrose station. The distance is about 12 miles. W. D. Lusk, of Montrose, is President.

Lower Laurentian.—This road, referred to last week, has been recently reorganized and several people residing in New York City have become interested in it. The line is now completed from St. Tite northeast for 20 miles toward Riviere à Pierre, a station on the Quebec & Lake St. John road, 56 miles north of Quebec. It is proposed to resume construction on the line early next spring and to complete it from Three Rivers north, following the west side of the River St. Maurice, crossing at the Grande Mere, to St. Tite, crossing the Piles Branch of the Canadian Pacific at St. Tite Junction, to St. Thecle, Notre-Dame des Anges, and Riviere à Pierre Station. From Three Rivers to St. Tite Junction is about 30 miles, and from there to Riviere à Pierre Station is 40 miles, making 70 miles altogether. The line passes through a fine agricultural and well-timbered country. The section between St. Tite Junction and Riviere à Pierre will be completed first. The ties and other timber are now being cut, and a party of engineers, in charge of James Cadman and B. Bourgeois, is surveying the eastern end of the line, toward Riviere à Pierre. Mr. C. Scott, 105 Mountain Hill, Quebec, formerly General Manager of the Nova Scotia Government Railroad, and also General Superintendent of the Quebec Government line, has the contract for completing the road.

Macon & Birmingham.—The locating surveys on this line are still in progress toward Birmingham, Ala., and the engineers are now about 30 miles from Woodbury, Ga., on the Georgia Midland & Gulf. Ground was broken last week on the section between Macon and Woodbury, Ga., 67 miles. J. S. McTighe & Co., of Memphis, Tenn., have the contract, and have the work sublet. The construction work will be comparatively light on this division. The grades are not heavy and the curves do not exceed six degrees. The heaviest structure is the bridge over Flint River, three miles from Woodbury, which will have two abutments and one pier, with spans of about 100 ft. each. There is a project to run a survey from Woodbury to Carrolton, 30 miles distant. The towns of Greenville and Thomaston are endeavoring to induce the company to make a deflection in the route as now surveyed, to have it pass through those towns. They are having a survey made to get the grade, but it is not thought probable that the company will alter its route.

Memphis & Charleston.—The Supreme Court of Alabama has given a decision sustaining the minority stockholders of this railroad company in their contest with the East Tennessee, Virginia & Georgia. The latter company owns a majority of the capital stock of the Memphis & Charleston, and has been charged with managing that road in the East Tennessee, Virginia & Georgia's interest, irrespective of the investment rights of the Memphis & Charleston minority shareholders. Alabama laws forbid the ownership of one railroad by another under such conditions as prevail in this case, and upon this ground the Alabama Supreme Court declares that the East Tennessee, Virginia & Georgia cannot vote the stock held by it in the election of directors and officers. The court permits the company to sell the stock it controls. An arrangement may thus possibly be made by which the East Tennessee, Virginia & Georgia will sell its stock to the Richmond & Danville.

Missouri Pacific.—E. P. Reynolds & Co., of Wymore, Neb., have the contract for building the line from McGhee, Ark., on the St. Louis, Iron Mountain & Southern, south through Dermott to a connection in Louisiana with the Houston, Central Arkansas & Northern, which is being built north from Monroe. The line just put under contract is approximately 67 miles long. The maximum grade is about 16 ft. to the mile. The curvature is quite light. The contractors have opened an office at Dermott, Ark.

Mobile & Ohio.—Preliminary surveys have recently been completed from Okolona southeast to Houston, the county seat of Chickasaw County, Miss. The line is nearly 19 miles long and has a grade of 66 ft. to the mile, with maximum curves of six degrees. It has not yet been decided to build the branch.

Montgomery, Tuscaloosa & Atlantic.—The contracts for building this extension of the Alabama Midland from Montgomery to Maplesville, Ala., have been let, and the contractors' forces are beginning to arrive. S. C. Pruitt has a section of three miles.

Newport News & Mississippi Valley Co.—A double track is to be built between Huntington and Ashland, Ky., a distance of 16 miles.

New Roads.—Grading is in progress on a short road in New Jersey, from Brown's Mills Station, on the Pennsylvania, south to Brown's Mills, a summer resort in Burlington County.

Norfolk & Western.—George T. Mills, of Pulaski, Va., has the contract for building the 16 miles of the North Carolina division from Ivanhoe, Va., south, referred to last week.

The following contractors are still working on the Clinch Valley Division: McGrann & Stewart; George T. Mills; L. H. Vaughan & Co., and Sexton & Houston for grading and masonry; Cofrode & Evans for bridges and trestles, and W. F. Patterson for bridges and trestles. Cofrode & Evans have also the contract for building 920 ft. of bulkhead and a warehouse pier 765 ft. × 190 ft. at Lambert's Point, Norfolk.

Omaha & South Dakota.—This company was organized at a convention held in Mitchell, S. D., of delegates from the towns along the route. The articles of incorporation provide for a road from Forest City to Omaha, a distance of 355 miles, via Blunt, Mitchell and Yankton.

Oregon Pacific.—The tracklaying on this road has reached a point 60 miles east of Albany, Ore. A large force is grading near the summit of the Cascade Mountains. But 15 miles remain to be finished to complete the road to the summit.

Philadelphia & Sea Shore.—Work is in progress on the southern end of this road at several points. Adam Loper has the contract for a five-mile section from Tuckahoe, N. J., to a point south of Petersburgh, on Cedar Swamp Creek.

Pittsburgh & Lake Erie.—The company is to extend its double track from McKeesport, Pa., four miles to Boston, 87 miles from Pittsburgh. A section of the road between Buena Vista and West Newton is now double tracked, and this is to be extended.

Rio Grande Junction.—About 20 miles of grading has been completed between Rifle Creek and Grand Junction, Col., a total distance of 63 miles. Several of the sub-contractors have not yet begun work on their sections, but the work will probably be finished by March.

Rio Grande Southern.—Two parties of engineers are now surveying this line between Dallas and Durango, about 160 miles. Both points are on the Denver & Rio Grande. The road will be narrow gauge, and it is stated that grading will begin in February. Otto Mears, of Silverton, Col., is president.

Rockbridge, Alum Springs & Goshen.—This company has been organized to build a ten-mile road from Rockbridge to Alum Springs and Goshen. James A. Frazier is one of the promotors.

Salem, Astoria & Eastern.—This company has been organized at Salem, Ore., to build a road from Salem to Astoria and Mill City. The capital stock is $200,000. The survey is to begin immediately.

Scioto Valley.—The Special Master Commissioner advertises the sale of this road, extending from Columbus to Petersburgh, on the Ohio River, 131 miles, which is to be held at Columbus, Jan. 22. The action is in the suit brought by C. P. Huntington and other bondholders.

Seattle, Lake Shore & Eastern.—A notice was published last week of contracts let on the Northern branch of this road. Additional sections have since been awarded, and 40 miles of the line is now under contract. The following contractors now have work on the branch: Earle & McLeod, for 15 miles north of their present contract to the fiftieth mile north of Snohomish; Smith Brothers for the first 15 miles north of the Skagit River; the next section of five miles is let to A. W. Moore, the next five miles to Clements & Bradford, and the remaining five miles to M. J. Heeney. The contract for trestling and bridging will probably be let to the San Francisco Bridge Co. There is still 15 miles of the branch not yet let. The grading on the sections just put under contract is to be done by June 1 next, and tracklaying will probably be finished three months later.

Sioux City & Northern.—E. P. Reynolds & Co. have about completed the 96 miles from Sioux City, Ia., north to Garretson, S. D., for which they have the contract. The grading on the road is very light, and the maximum curves are three degrees. The tracklaying will probably be completed by Jan. 1.

South Beach.—The directors have voted to issue $150,000 of first mortgage 30-year 5-per cent. bonds to construct a line between Arrochar, on the Staten Island Rapid Transit road, and New Dorp, three and a half miles. The entire road is to be double tracked.

Ticonderoga.—This company, referred to in our issue of Dec. 6, has filed its charter at Albany, N. Y. It is to build a road, two miles long, from the town of Ticonderoga, Essex County, on the Lake George & Lake Champlain road, westerly to the village of Ticonderoga and to Lake George, and thence southerly. The capital stock is $30,000.

Toledo, Ann Arbor & North Michigan.—A survey is to be begun in a few weeks from the River Rouge, just west of Detroit, to Ann Arbor.

Toledo, Columbus & Cincinnati.—The southern extension from Findlay has been completed through Arlington to Dunkirk, on the Pittsburgh, Fort Wayne & Chicago, about 10 miles north of Kenton.

Union Pacific.—Kilpatrick Bros & Collins, of Beatrice, Neb., have been awarded the contract for the extension from Milford, Utah, to Pioche, Nev., a distance of about 120 miles. The work includes grading, tracklaying and bridging, and is to be completed by July 1, next. The same firm has been awarded the contract for changing the grade of the Utah & Northern branch from three feet to standard from Ogden north to McCannon, Idaho.

The statement for the whole system for October and the ten months to Oct. 31 is as follows:

Month of October:	1889.	1888.	Inc. or Dec.
Gross earnings	$4,270,476	$4,017,685	I. $252,791
Oper. expenses	2,391,099	2,292,742	I. 98,357
Net earnings	$1,879,377	$1,724,943	I. $154,434
Jan. 1 to Oct. 31:			
Gross earnings	$32,431,548	$32,222,407	I. $209,141
Oper. expenses	19,985,503	20,183,554	D. 198,051
Net earnings	$12,446,045	$12,038,853	I. $407,192

TRAFFIC.

Traffic Notes.

The Western States Passenger Association was finally dissolved Dec. 19.

The Northern Pacific now makes the same rates to Seattle, Wash., as to Tacoma.

The St. Louis & San Francisco has given notice of withdrawal from the Trans-Missouri Association.

The Memphis Traffic Association has issued a circular to shippers calling their attention to the clause of the Interstate Commerce law forbidding false classification.

The South Carolina House of Representatives has rejected the bill recommended by the Governor requiring separate cars for whites and blacks. It was argued that the law was unnecessary, as nearly all colored people travel in second-class cars.

The quarterly passenger rate meeting of the Central Traffic Association for preparing the rates to be published Feb. 1, will be held in Chicago, Jan. 3. The sheets must be completed to mail to the Interstate Commission Jan. 18, and therefore cannot be sent out to individual roads for revision.

The special board of arbitration, consisting of Messrs. Walker, Midgely, Faithorn and Finley, has prepared a new tariff for Kansas and Nebraska rates, in which there are many material reductions from the list formerly considered, allowance for local circumstances having been made in a great many cases.

A complaint has been filed with the Interstate Commerce Commission by William A. Harvey against the Louisville & Nashville, alleging violation of the Interstate Commerce Act in furnishing to certain members of the City Council of New Orleans and others free passes, good for transportation from points in the State of Louisiana to different points in other states.

The Trunk lines are endeavoring to agree upon a uniform bill of lading. The Central Traffic Association, in which the roads already have a standard form, takes part in the conference, and an attempt will be made to agree upon a standard for the whole of the territory of both associations.

Demurrage.

The scarcity of cars has drawn renewed attention to the question of demurrage. The feeling is growing that the thing must be pushed at all centres. Complaints of scarcity are heard from all quarters and discussion must wait till the actual work is a little lighter. Business men must now see the help to them which a good demurrage system affords. On the other hand, the Connecticut Legislature passed a law forbidding demurrage charges, and a Coventry firm has brought suit to recover property held for demurrage by the New York & New England.

A New Northwestern Route.

A new through route from St. Paul and Minneapolis to the Atlantic seaboard has been formed by the Green Bay, Winona & St. Paul, the Milwaukee, Lake Shore & Western, and the Flint & Pere Marquette. It is via Manitowoc, Ludington, Saginaw and Port Huron, thence to Buffalo via the Grand Trunk, and thence to New York via the Delaware, Lackawanna & Western. Two steamers are to be leased at once, pending the construction of new boats to reinforce the Flint & Pere Marquette Lake Michigan fleet of four steamers to ply between Manitowoc and Ludington. The distance over this route from St. Paul to New York is 1,206 miles. This arrangement goes into effect Jan. 1.

A Flour Blockade.

Milwaukee at the present time is the eastern terminus of a flour blockade that extends as far west as Minneapolis, and bids fair to last for several weeks. It is reported that the St. Paul road alone has 800 cars of flour there and on side tracks along the line, while the Wisconsin Central is in the same predicament, and has filled its sidings at other points. The trouble is that the roads on the other side of Lake Michigan are not taking the flour fast enough, partly because the Michigan lines are short of cars and partly because the bar at Grand Haven delays boats.

Mr. Walker on Passenger Rates.

Chairman Walker, of the Interstate Commerce Railway Association, has sent out the following letter to members of the Association:

In view of the anticipated dissolution of the Western States Passenger Association on Jan. 1, 1890, it seems proper to remind members of the fact that the obligations of the Interstate Commerce Railway Association agreement in respect to the maintenance of the rates, rules and regulations in force upon the passenger traffic of each line are not affected by changes which may occur in the relations of the lines of auxiliary associations. It is presumed that some method of effecting ordinary changes in such rates, rules and regulations will be provided for by the managers. Competition of lines outside the association can be met under what is known as Mr. McMullin's resolution.

Anthracite Coal Tonnage.

The statement of anthracite coal production for the month of November, 1889, as compared with the same period last year, is as follows:

	Nov.		
	1889.	1888.	Dec.
From Wyoming region	1,803,650	1,952,029	148,380
From Lehigh region	569,488	601,894	3,405
From Schuylkill region	999,676	1,164,729	165,053
Total	3,372,814	3,718,651	345,838

	Year.		
	1889.	1888.	Inc. or Dec.
From Wyoming region	17,255,895	20,327,787	D. 3,071,891
From Lehigh region	5,802,757	5,120,062	I. 682,695
From Schuylkill region	9,613,323	9,993,946	D. 380,623
Total	32,671,975	35,441,795	D. 2,769,819

The stock of coal on hand at tide-water shipping points, Nov. 30, 1889, was 771,334 tons; on Oct. 31, 1889, 704,909 tons, an increase of 66,425 tons.